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INDIA RUBBER WORLD

SEPTEMBER, 1948

A BILL BROTHERS PUBLICATION

TEST RECIPES

	A	B
PALE CREPE	100.0	100.0
SULFUR	2.0	2.0
ZINC OXIDE	5.0	5.0
THIONEX	0.2	0.125
BARAK	—	0.5

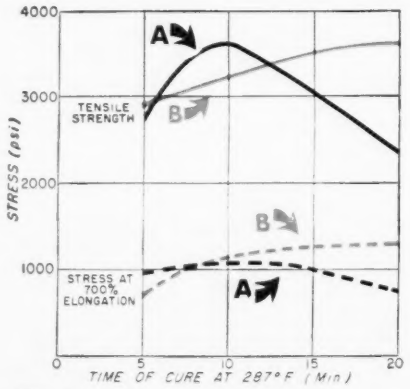

FIG. 1

TEST RECIPE

SMOKED SHEETS	100.0
ZINC OXIDE	5.0
SULFUR	3.0
EPC BLACK	25.0
THIONEX	0.15
BARAK	1.0

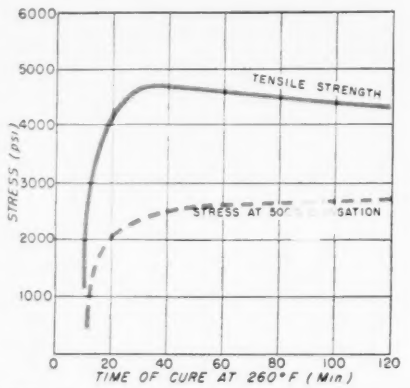

FIG. 2

Prevent "peaky" cures with DU PONT

BARAK

An Accelerator Activator

Used with thiuram, thiazole or thiazoline accelerators, Barak effectively extends the curing range of rubber stocks. Even with accelerators having exceptionally "peaky" curing characteristics, the effect of Barak is outstanding.

In Fig. 1, the value of Barak in extending the curing of a Thionex-accelerated gum stock is demonstrated. Judged by either tensile strength or modulus, the stock containing Barak has a much longer curing range . . . displays less tendency to revert.

In Fig. 2, the effectiveness of Barak in a Thionex-accelerated stock containing carbon black is shown. Optimum tensile strength was obtained in 30 minutes, yet even after 120 minutes there was no change in tensile strength or modulus.

In addition, the use of even small percentages of Barak allows a substantial reduction in the quantity of stearic acid necessary in the compound. And, too, reduced quantities of accelerator are required since Barak is an effective accelerator activator. Our technical representatives will be pleased to advise you on the use of Barak in your stocks. Or write: E. I. du Pont de Nemours & Co. (Inc.), Rubber Chemicals Division, Wilmington 98, Delaware.

Tune in to Du Pont "Cavalcade of America," Monday Nights—NBC Coast to Coast

DU PONT RUBBER CHEMICALS

E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Del.

DU PONT

BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY

INDIA RUBBER WORLD, September, 1948, Vol. 118, No. 6. Published Monthly by BILL BROTHERS PUBLISHING CORP., Office of Publication, Orange, Conn., with Editorial and Executive Offices at 386 Fourth Avenue, New York 16, N. Y., U.S.A. Entered as Second-Class Matter at the Post Office at Orange, Conn., under the act of March 3, 1879. Subscription United States and Mexico, $3.00 per year; Canada, $4.00; All Other Countries, $5.00; Single Copies 35 cents. Address Mail to New York Office

TWO NEW HYCAR AMERICAN RUBBERS

Hycar OR-25 EP *(Easy Processing)*
Hycar OR-25 NS *(Non-Staining)*

HERE are two new American rubbers, both with superior processing characteristics. Hycar NS and Hycar EP differ only in that a special anti-oxidant has been used in the NS, making it non-staining and non-discoloring. This is an outstanding quality, particularly desirable in the fabrication of light colored products. The new Hycar rubbers have all these advantages over the regular process Hycar OR-25:

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2. Better extrusion characteristics—less nerve and less heat build-up.
3. Excellent high temperature mixing.
4. Better fusion and mold flow characteristics.
5. Increased building tack for laminated products, such as frictioned stocks and calendered sheeting.

Both rubbers retain those properties which make Hycar American rubbers so usable for so many products . . . permanent resiliency and superior resistance to oil, abrasion, and aging. Ask your supplier for parts made from Hycar. Or write to Dept. HA-9, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

Hycar
Reg. U.S. Pat. Off.
American Rubber

B. F. Goodrich Chemical Company
A DIVISION OF THE B. F. GOODRICH COMPANY

GEON polyvinyl materials • HYCAR American rubber • KRISTON thermosetting resins • GOOD-RITE chemicals

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(from abrasion)

WITH PHILBLACK O!

Philblack O could win on abrasion resistance alone! In addition, he has a sky-high batting average on resistance to cut and crack growth. Make no mistake about it . . . Philblack O has what it takes for Big League performance! Speed! Stamina! Endurance! Versatility! Teamwork!

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Phillips 66

Rubber Chemicals Division

EVANS SAVINGS AND LOAN BUILDING · AKRON 8, OHIO

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1. Greater Plasticizing Action on Natural Rubbers—25 per cent more than other commonly used activators and processing aids.

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3. Stronger Activation of Thiazoles in Natural Rubber—soluble zinc is immediately available for activation and offers economy in compounding for maximum properties in tread and similar stocks.

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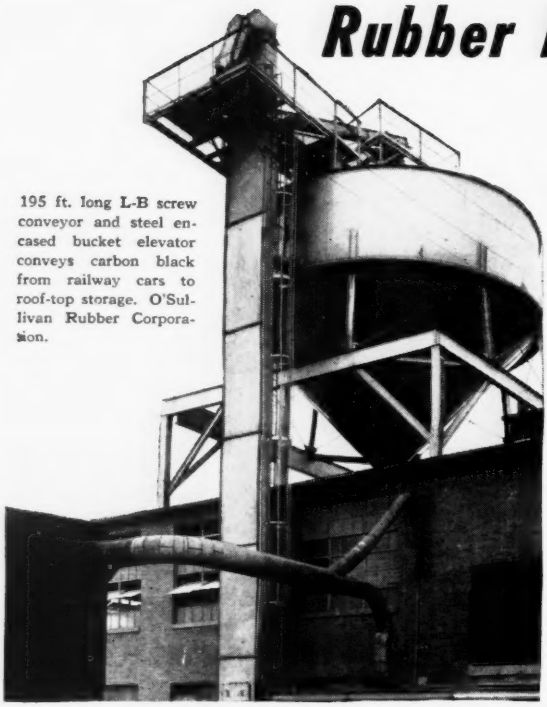
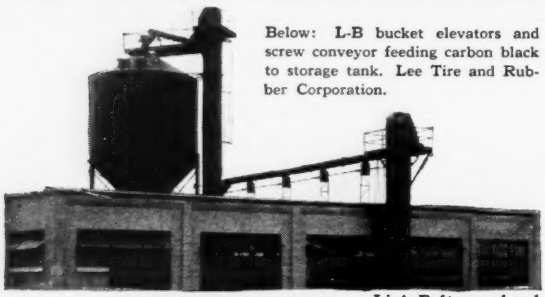
Rubber Industry Handling Jobs

MADE EASY WITH

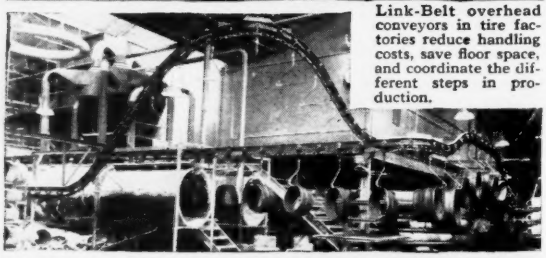
LINK-BELT CONVEYORS



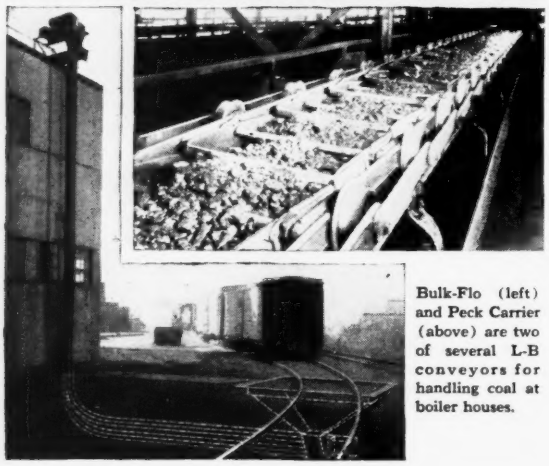
195 ft. long L-B screw conveyor and steel encased bucket elevator conveys carbon black from railway cars to roof-top storage. O'Sullivan Rubber Corporation.



Below: L-B bucket elevators and screw conveyor feeding carbon black to storage tank. Lee Tire and Rubber Corporation.



Link-Belt overhead conveyors in tire factories reduce handling costs, save floor space, and coordinate the different steps in production.



Bulk-Flo (left) and Peck Carrier (above) are two of several L-B conveyors for handling coal at boiler houses.

In the broad Link-Belt line, there's a type to suit every requirement . . . . .

• About the meanest handling job in the rubber industry is conveying carbon black, but makers and users alike are reporting highly satisfactory service from Link-Belt conveyors and elevators on this difficult assignment. Pictured here are typical installations of Link-Belt screw conveyors and bucket elevators, which have overcome major difficulties of handling this material in a clean and waste-free manner.

Link-Belt elevating and conveying machinery includes types especially suited to handling coal and ashes, as well as overhead conveyors for moving rubber sheets, rubber products and molds through the various processes. Link-Belt belt conveyors and Bulk-Flo elevator-conveyors have special advantages for certain types of materials. Consult Link-Belt and be sure to receive equipment of the right type, and helpful counsel from materials handling specialists, to make the most effective application.

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VULTROL
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to prevent scorching, and for recovering
scorched stocks
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ROSE BUILDING, CLEVELAND 15, OHIO

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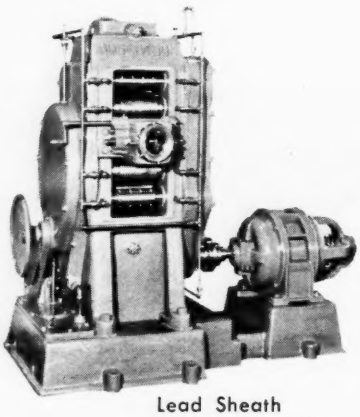
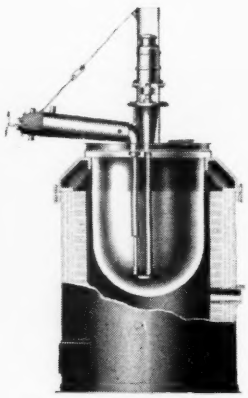


Lead Sheath Stripping Machine



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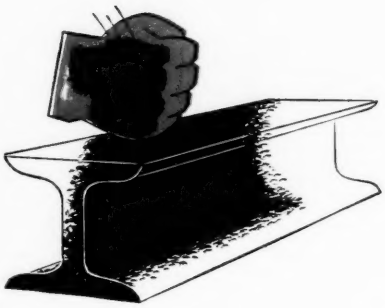
Since 1858



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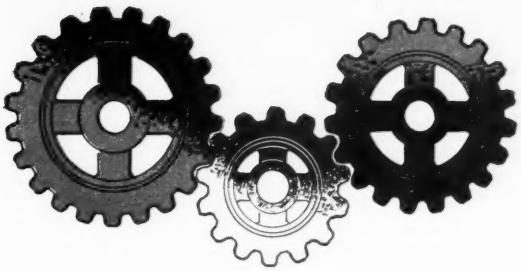
Marvinol's high molecular weight offers you extra toughness and "dryness," longer durable life, greater flexibility, resistance to tear, wear, oils, acids. Marvinol-based products are waterproof.



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The Glenn L. Martin Company compounds and fabricates only in its customer service laboratory for your benefit. We sell only raw materials. Let our field engineers and customer research laboratory help solve your processing problems. The new ultra-modern Marvinol plant is equipped to insure uniform product of highest quality.

Superior Characteristics of MARVINOL® Vinyl Resin offer you many advantages...

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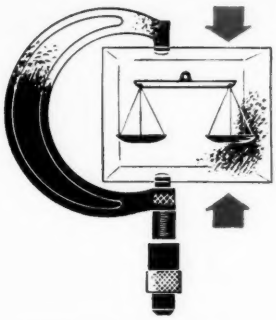
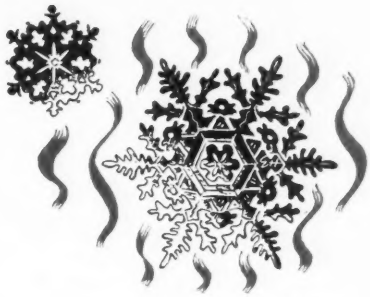


GREATER STABILITY

In processing and in end products, Marvinol offers superior resistance to heat, light, other normally destructive forces.



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Marvinol resins assure you end products that show less deformation due to heat and better low temperature flexibility.

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We are proud of our record in supplying various types of special fractions to industry — and we never cease working to uphold it. We have our own facilities for producing, purifying, fractionating, handling, storing, and transporting SKELLYSOLVE.

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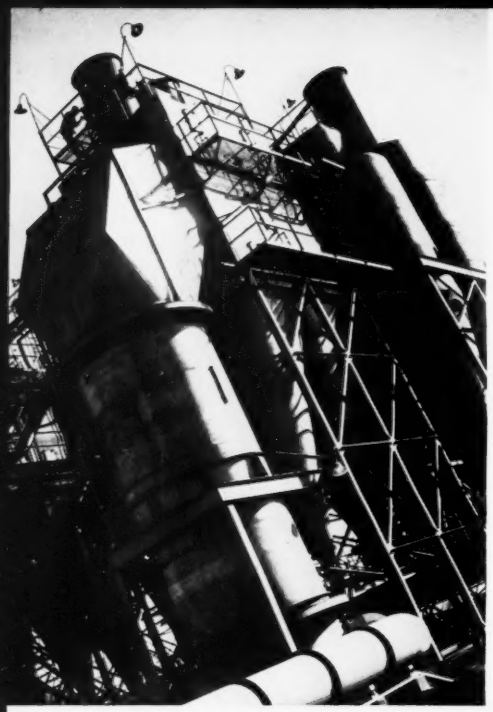

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1. In providing you with valuable data that may help you formulate better, more durable rubber compounds with **Pliolite S-6.**

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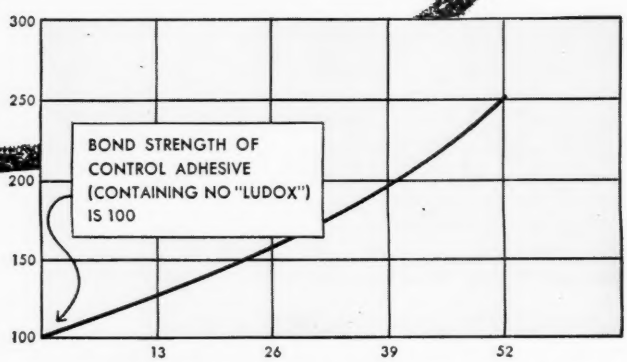

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Also increases modulus and wear resistance of latex films and coatings

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"LUDOX" STRENGTHENS—as much as two to three times—latex adhesion to a wide variety of surfaces . . . including fabric to fabric, leather to leather, and latex to metal. And, in many instances, it gives superior bonds where there is no adhesion with silica-free latex compositions.

Improves Latex Films and Coatings

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New 30% Concentration Now Available

"LUDOX" is now available as a 30% aqueous, colloidal solution . . . highly fluid and substantially free of alkali.

"LUDOX" contains silica high in purity . . . chemically reactive and finely subdivided. The particle size is less than 1/1,000,000 of an inch.

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For further information on how "Ludox" can help you make better latex products, write or wire Du Pont today. A Du Pont technical representative will be glad to discuss with you the application of this new development to your own products.

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SYNVAR RESINS

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Also — SYNVARITE RC Resins and Solutions for Rubber Cements and Adhesives. Excellent Solvent Release.

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...THROUGH CHEMISTRY

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Akron-Standard stock servicers are made in many sizes. Both sets of stock rolls are connected together by chain drive to sprockets from motors mounted on side of frame.

FOR USE WITH ANY SINGLE OR DUAL BEAD TIRE-BUILDING MACHINE

Akron-Standard stock servicer for truck and tractor tire-building machines.

Another Akron-Standard aid to modern, streamlined production — a stock servicer which supplies material to the tire builder without leaving his position (ideal for women operators). It handles plies, chafers, tread and breaker. No placing of fabric in loose liners — no more unnecessary handling anywhere! Uniform tension makes for a uniform product. The tire builder controls each roll with an index button which operates the motor drive. A limit switch automatically stops the roll. The stock rolls are filled so that each ply comes in proper sequence with the cord angles reversed correctly as applied to the drum. The Akron-Standard stock servicer is ideal for any machine building passenger, truck or tractor tires.

Details. On one side of the upper unit are 12 rolls, six of which carry the self-winding liner and six the stock fabric for the operator. The stock is fed to the rolls at the back. When filled, the turret is turned for the next tire.

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The Akron Standard Mold Co.

1624 Englewood Avenue *"The Established Measure of Value"* **Akron 5, Ohio, U. S. A.**

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Time to switch to G-E Silicone Mold Release Agents!

Is your rubber or plastics molding production being held up by too much down time? Then here's the answer to your problem. Switch to General Electric silicones for your mold release agents.

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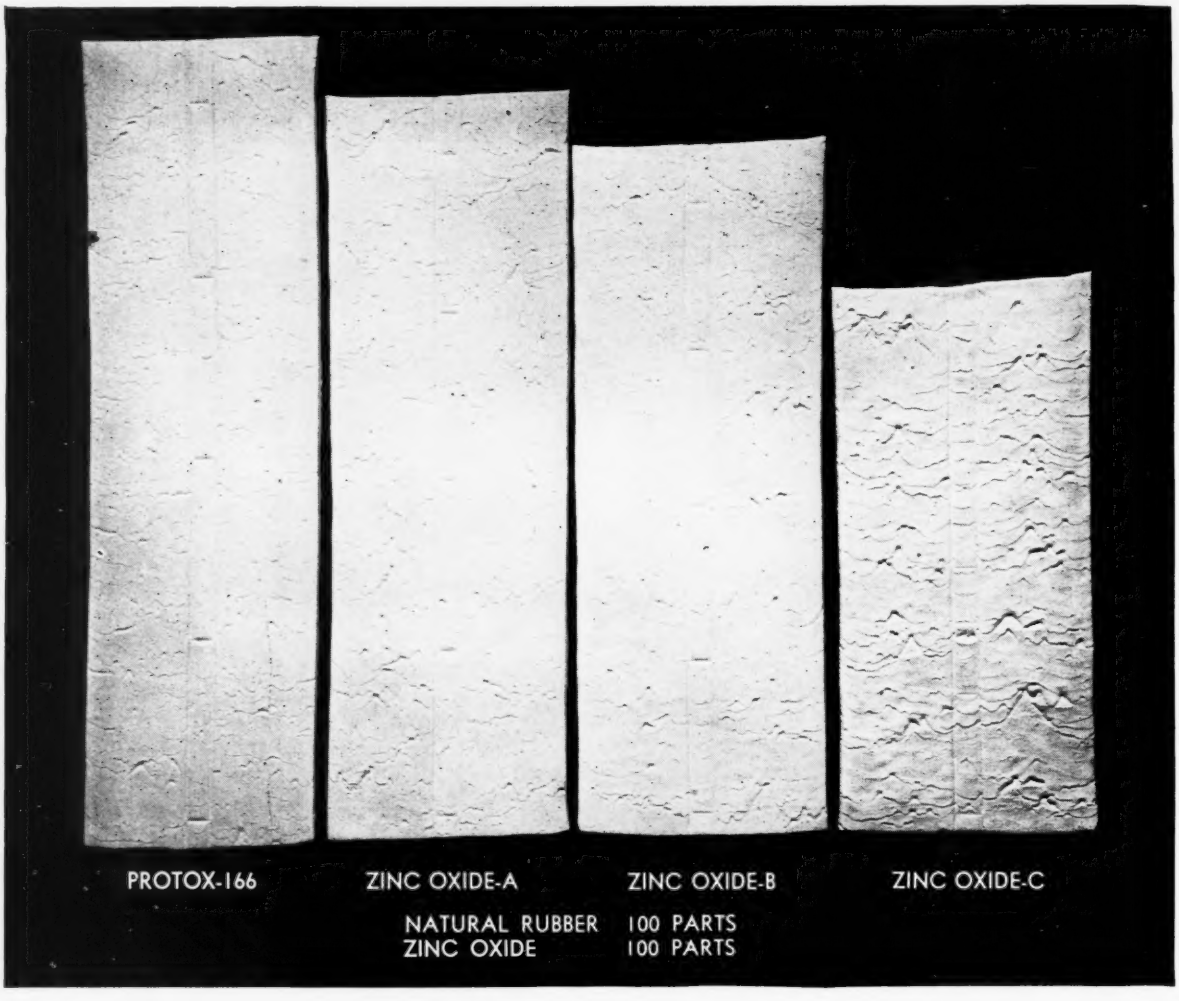
FLINTKOTE *Products for Industry*

PROTOX-166 ZINC OXIDE*



CALENDER SHRINKAGE

EQUAL PARTS by weight of zinc oxides of varying physical and chemical properties, and of natural rubber were compounded and mixed under the same conditions, and allowed to stand overnight. The following day the stocks were warmed up and calendered. A device attached to the calender marked the specimens at regular intervals.

On cooling, the contractions for the several brands were as follows:

Protox-166	—	39.4%
Zinc Oxide-A	—	46.7
Zinc Oxide-B	—	49.0
Zinc Oxide-C	—	59.2

We'll gladly discuss the value of PROTOX-166 in your processing, whether it involves calendering or tubing, and send you a sample for testing. By the way PROTOX-166 was formerly known as XX-166, and it carries *no* price premium.

* *U. S. Patents 2,303,329 and 2,303,330*

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THE NEW JERSEY ZINC COMPANY

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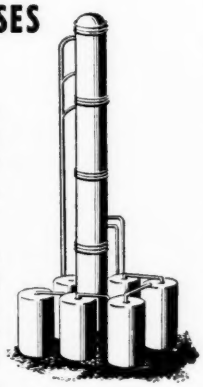
Announcing

SWIFT'S FATS and FATTY ACIDS

for technical uses

Swift & Company is now inviting inquiries on its new lines of fatty acids and fractionated glycerides. Extensive use of solvent processes will make possible new high standards of purity and stability.

1 THE PROCESSES



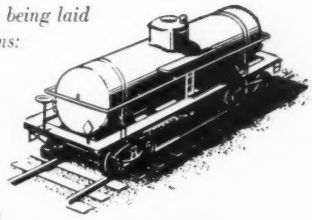
Solvent processes yield fat fractions of higher quality and wider usefulness. Most of Swift's new fats and fatty acids will be processed with solvents.

Unsaturated acids and drying oils will be separated by the Solexol process, using propane as a solvent. Fractions are separated selectively at temperatures not exceeding 200 degrees F. Since thermal and chemical side reactions are thereby avoided, products of greater purity and stability are obtained.

Saturated acids will be fractionated by solvent crystallization. Here, too, processing temperatures are low and harsh catalysts are absent, so that the natural structure of the substances is preserved.

2 THE PRODUCTS

Production plans are being laid for the following items:



Swift's Mixed Fatty Acids

Swift's Cottonseed Fatty Acids
Swift's Animal Fatty Acids
Swift's Linseed Fatty Acids
Swift's Corn Oil Fatty Acids
Swift's Soybean Oil Fatty Acids
Swift's Palm Oil Fatty Acids
Swift's Hydrogenated Marine Oil Fatty Acids

Swift's Fractionated Fatty Acids

Swift's Stearic Acid
Swift's Oleic Acid

Swift's Drying Oils

Swift's Fractionated Sardine Oil
Swift's Fractionated Menhaden Oil
Swift's Fractionated Soybean Oil
Swift's Fractionated Linseed Oil

Other Swift Glycerides

(*now in production*)

Swift's Lard Oils
Swift's Tallow Oil
Swift's Marine Oils
Swift's Neatsfoot Oil
Swift's Sperm Oil

Specialties

(*now in production*)

Swift's Sulfonated Sperm Oil
Swift's Sulfonated Tallow Oil
Swift's Sulfonated Castor Oil (Turkey Red Oil)
Swift's Sulfonated Neatsfoot Oil
Swift's Spermaceti
Swift's Textile Oils
Swift's Anti-foam Agents

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Union Stock Yards, Chicago 9, Ill.

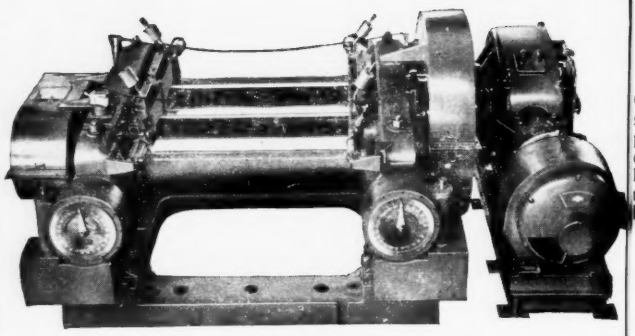
New Operational Features of ADAMSON UNITED Mills

suit them to specific compound requirements

Constant research, and intimate knowledge of production and processing requirements, have enabled us to make many improvements and variations in roll dimensions which have greatly improved the operating efficiency of our mills for the handling of both rubber and plastics.

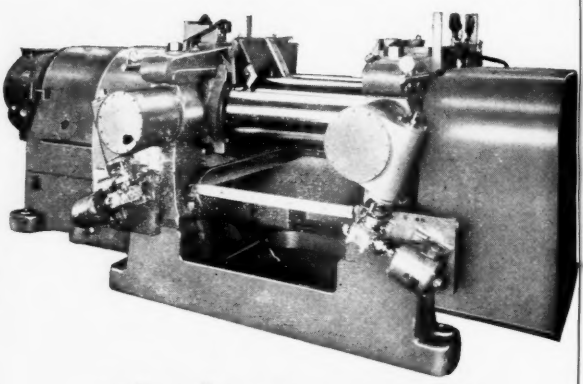
Your request for further details and specifications will be welcomed. The experience and abilities of our engineers in solving your processing problems, are available without obligation.

Write or wire us.



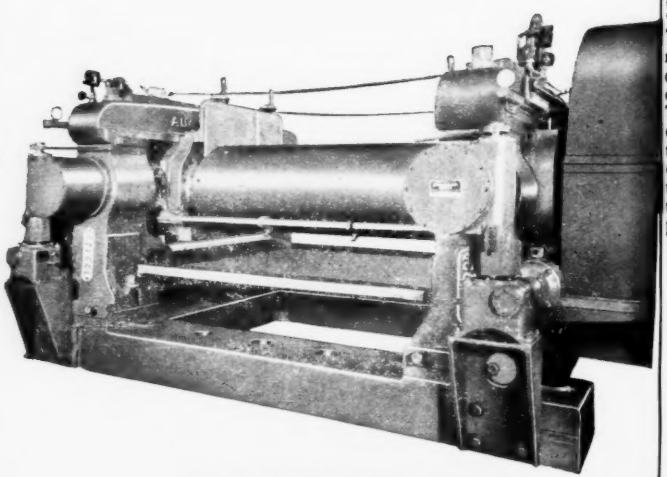
26"x80" PLASTICS MILL

This unit has right angle individual drive; flood lubricated roll boxes; motorized adjusting screws; pneumatic scraper and tiltable guides.



20"x48" SPECIAL PLASTICS MILL

. . . equipped with tiltable guides; individual motorized adjusting screws; reducer direct connected to rear roll (no bull gear and pinion) and two sets of connecting gears to provide two roll speed ratios.

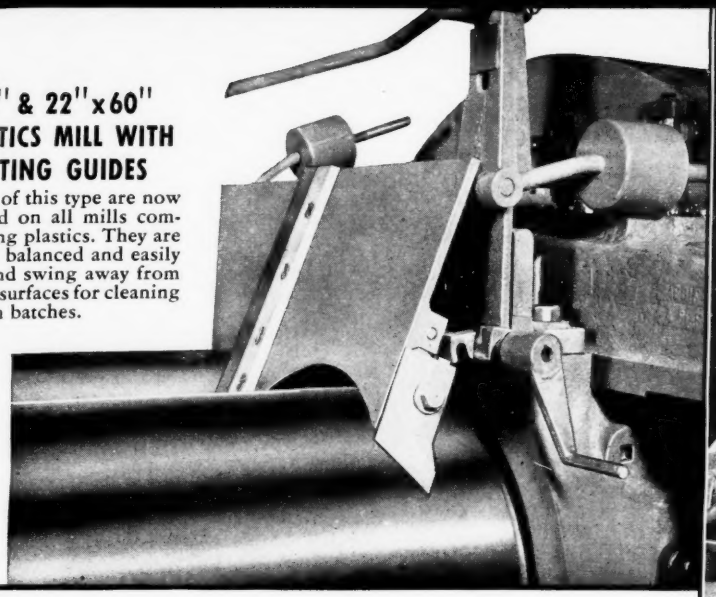


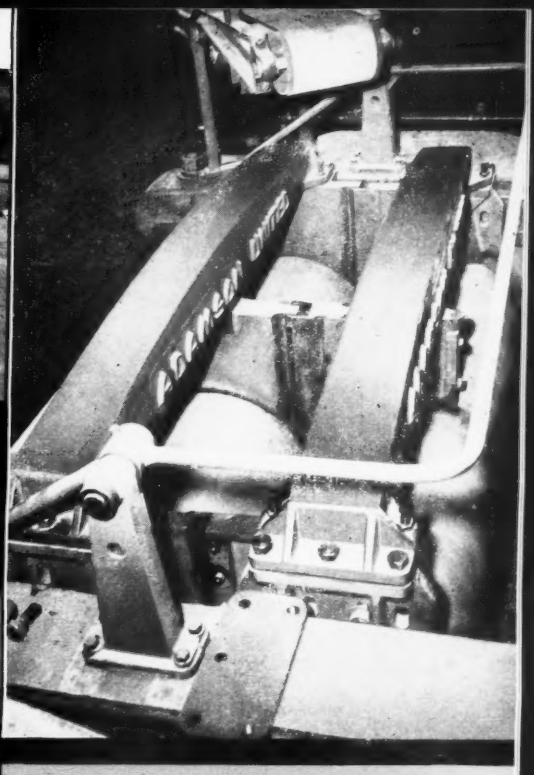
28"x84" RUBBER MILL WITH MOTORIZED ADJUSTING SCREWS

This is the latest type mill for handling large Banbury batches; breakdown and warming up. Corrugated rear rolls are optional.

22" & 22"x60" PLASTICS MILL WITH TILTING GUIDES

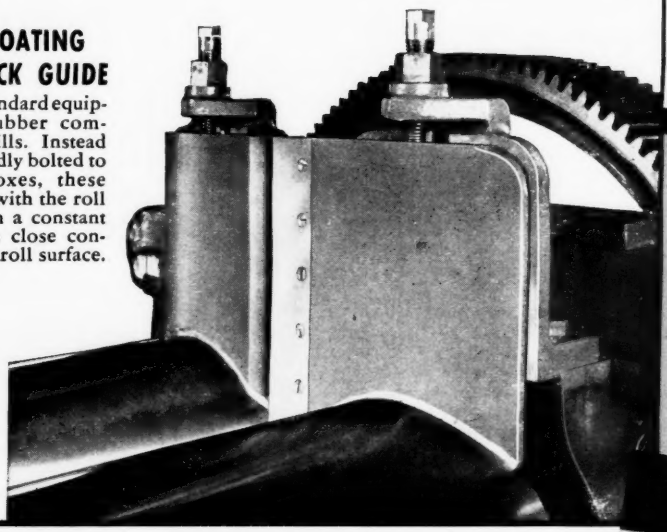
Guides of this type are now standard on all mills compounding plastics. They are counter balanced and easily lifted and swing away from the roll surfaces for cleaning between batches.





FULL FLOATING MILL STOCK GUIDE

These are standard equipment on rubber compounding mills. Instead of being rigidly bolted to the roll boxes, these guides float with the roll and maintain a constant seal through close contact with the roll surface.

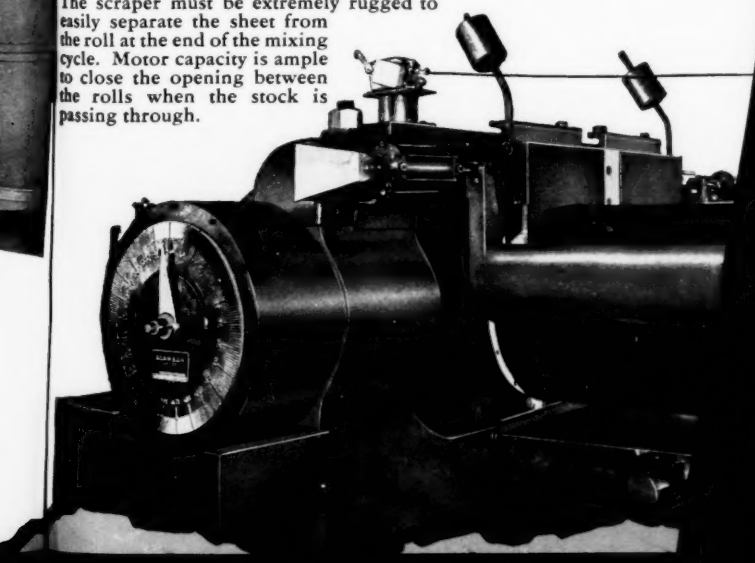


26" & 26"x84" MILL WITH CENTER GUIDE

The center guide is suspended from a heavy sectioned girder mounted on the roll boxes. It is in two parts which permits movement of the front roll half with the roll and greatly facilitates operations where a strip feed must be formed for tubes or calender. These mills are used where stock is warmed on one end and delivered to an extruding machine in ribbon form from the other end.

26"x80" PLASTICS MILL WITH MOTORIZED ADJUSTING SCREW AND PNEUMATICALLY OPERATED SCRAPER

The motorized adjusting screw and pneumatic scraper are necessary where quick opening and closing of rolls are required during each mixing cycle on plastics stocks. The scraper must be extremely rugged to easily separate the sheet from the roll at the end of the mixing cycle. Motor capacity is ample to close the opening between the rolls when the stock is passing through.



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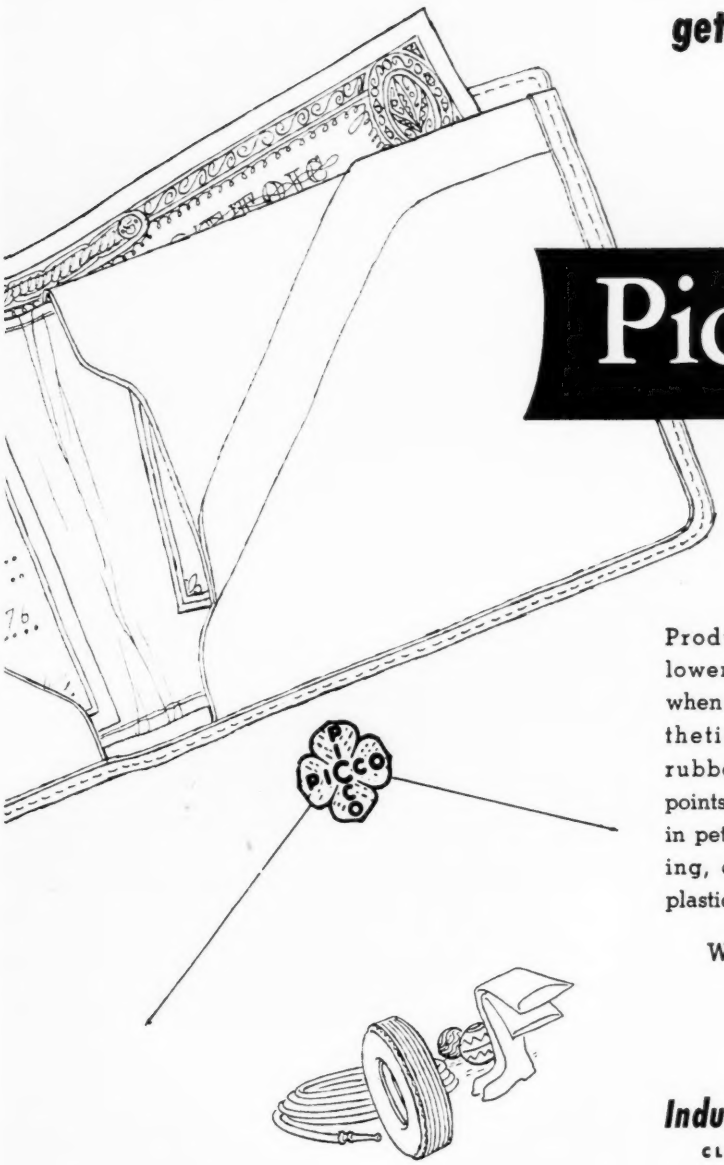

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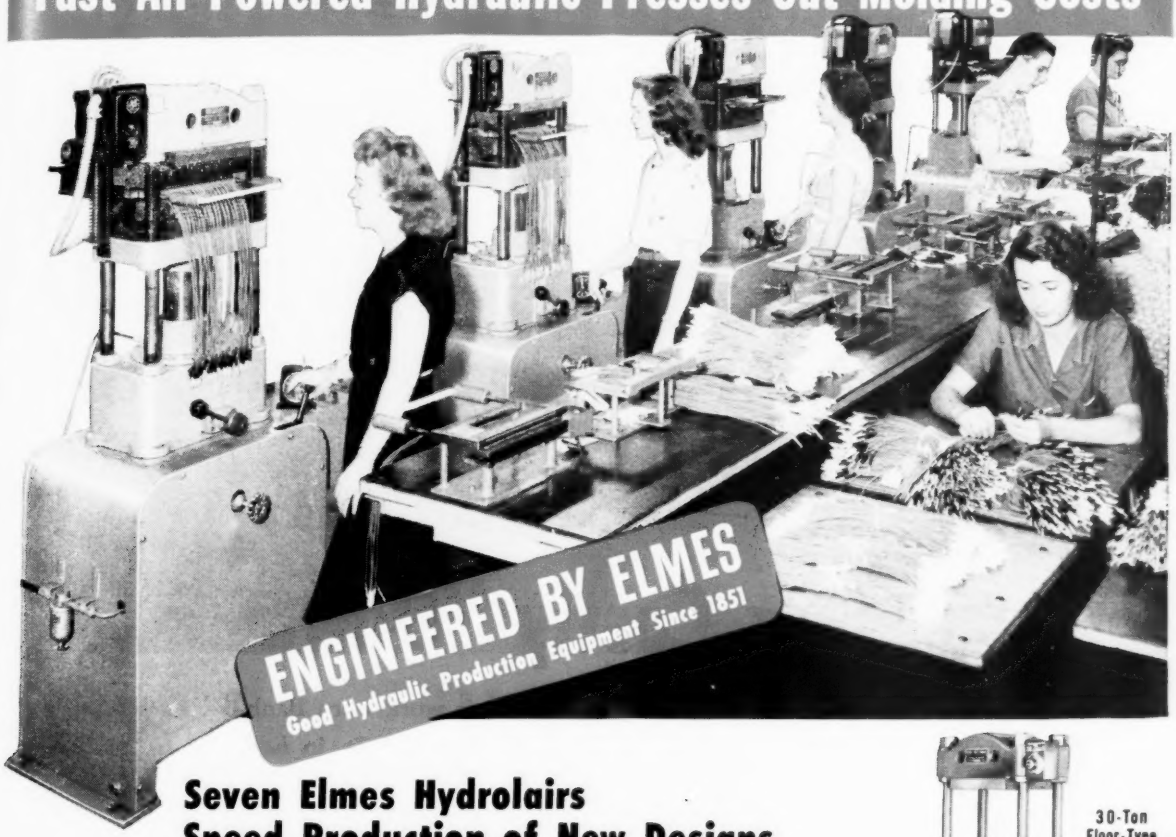

Seven Elmes Hydrolairs Speed Production of New Designs at Belden Mfg. Co.

"We're getting *excellent results* with Hydrolairs," says R. K. Schelke, Engineer at Belden Mfg. Co.—wiremaker for industry. "They're exactly what we need for *quality and speed* on molded plugs and sleeves. And they save money all around—on first cost, production costs, and maintenance. Hydrolairs are easy to install, simple to use, *always dependable.*"

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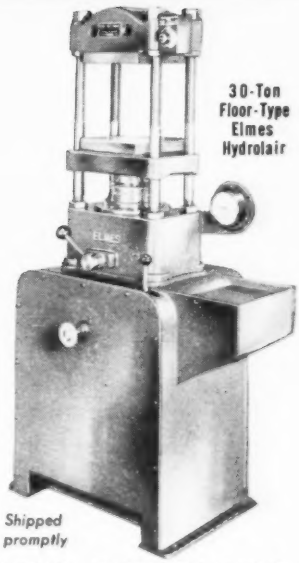

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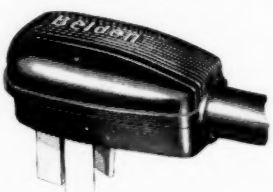

These new Belden one-piece rubber plugs, Hydrolair-molded around electric power cords, eliminate former complex plugs held by rivets.

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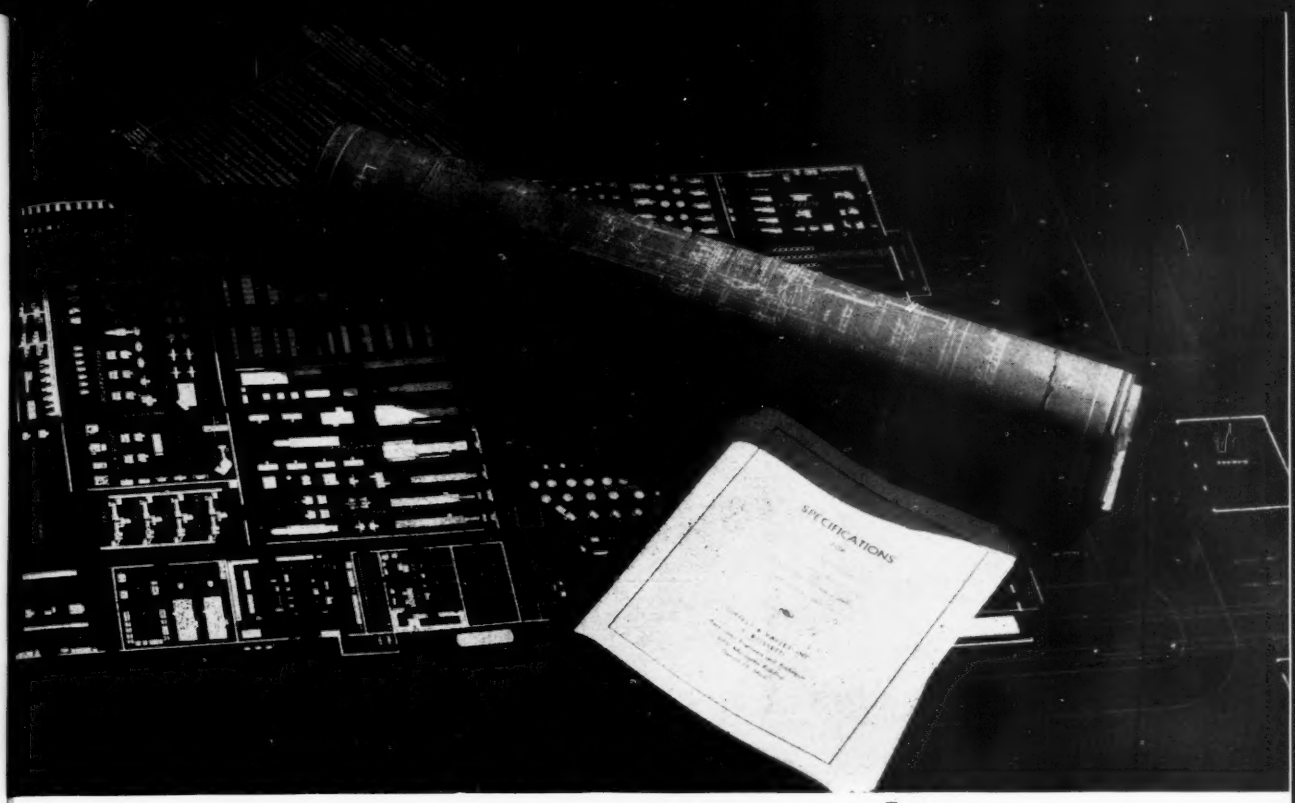

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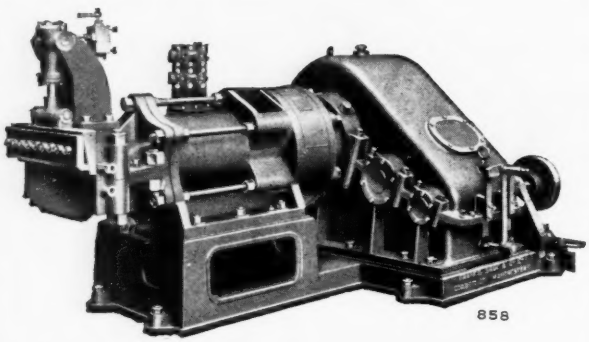

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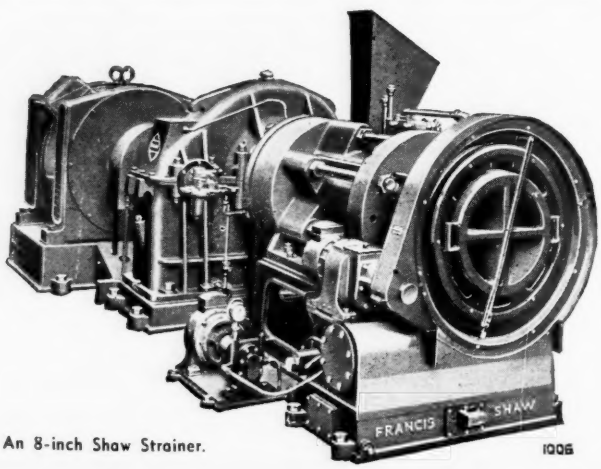

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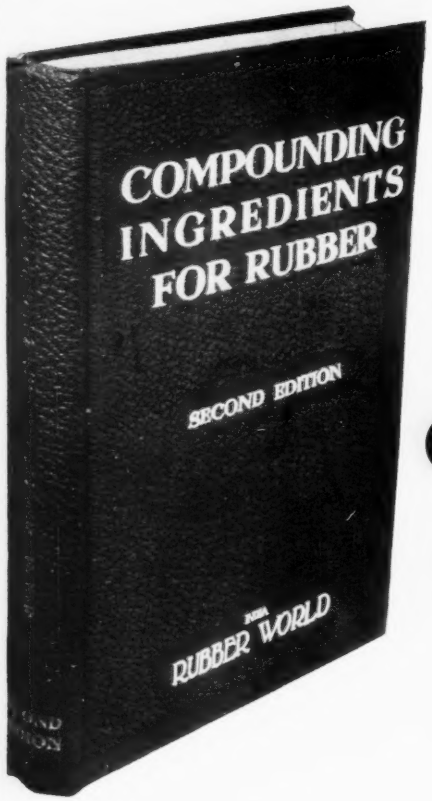

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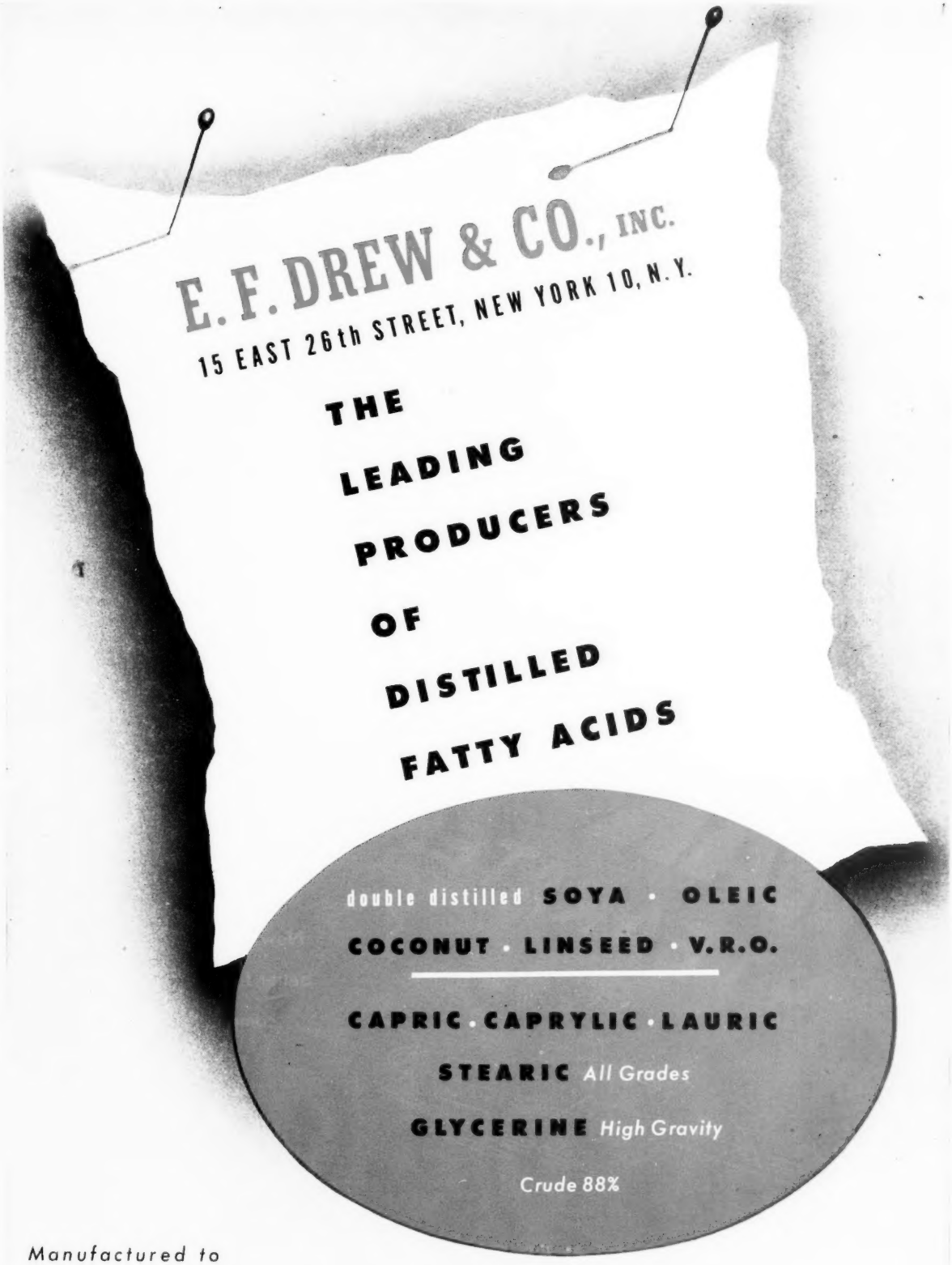
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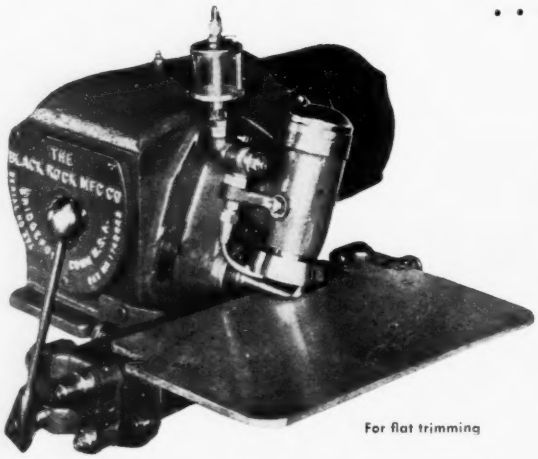

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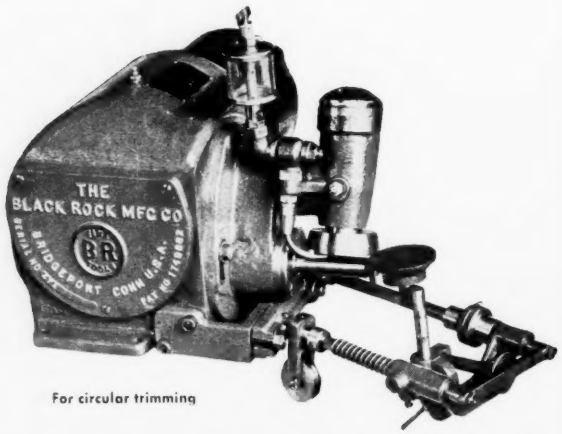

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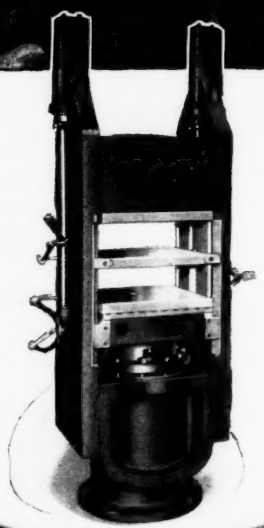

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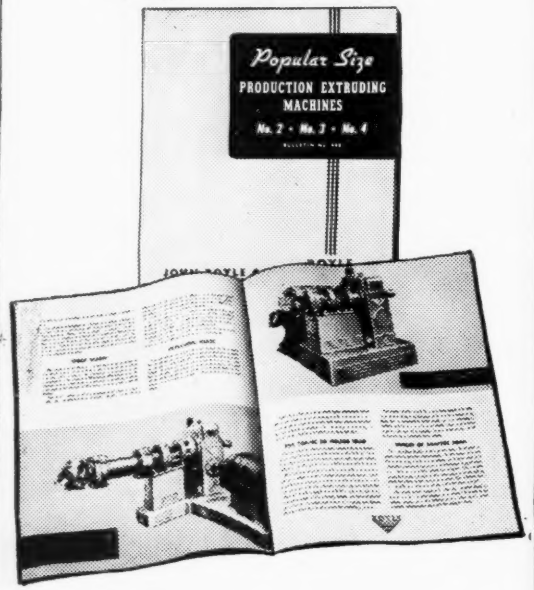

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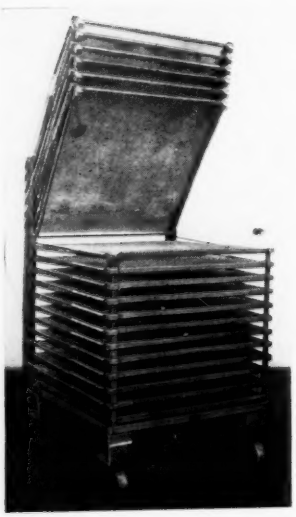

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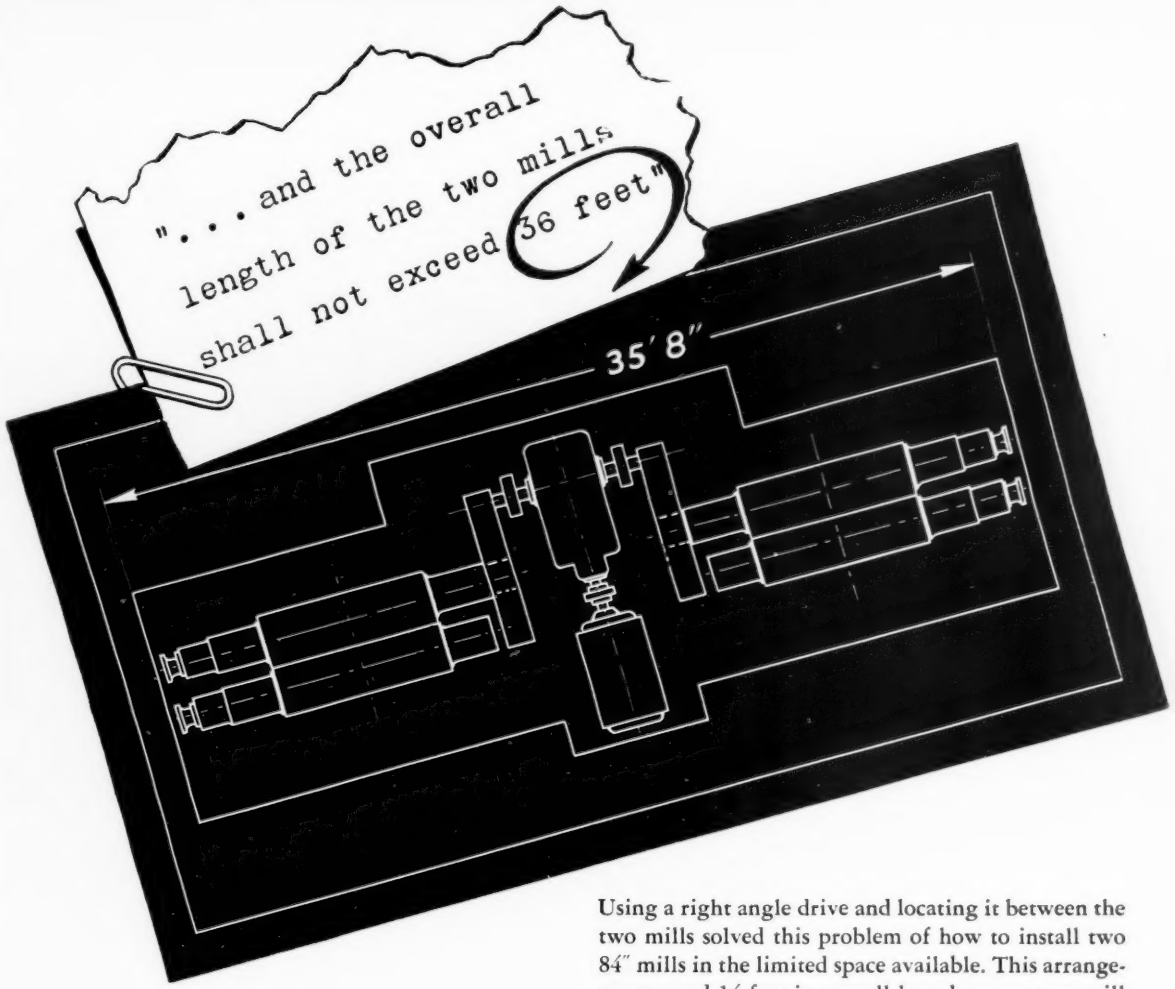

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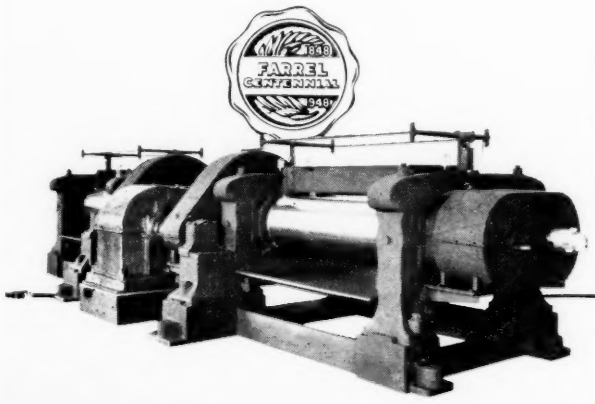

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Volume 118 Number 6

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INDIA
RUBBER WORLD

Volume 118 | New York, September, 1948 | Number 6

Clays for Rubber[1]

L. F. Gongwer

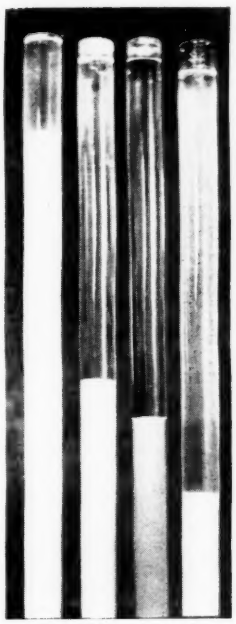

Fig. 1. Determining Clay Suspension Properties. The First Three Samples on the Right Are Soft Clays; the Sample at the Left Is a Hard Clay

CLAYS for use in natural and synthetic rubbers are almost without exception kaolinitic in character. Thus in speaking of clays of this class we are confined to kaolinites of varying degrees of differences in particle size and shape, origin and occurrence, and methods of manufacture.

Clay is defined as a dispersed system of mineral fragments of hydrated aluminum silicate in which particles smaller than two microns predominate, which is plastic when wet and permanently hard when fired. In a general way the name "kaolin" is applied to clays white in color, or which can be fired without discoloration.

Kaolinite, however, is a mineral of definite chemical composition and is expressed in chemical symbols as follows: $Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$. The origin of kaolinite from feldspathic or other related rocks is the result of weathering processes believed to have taken place in several different ways. The resulting deposits of these clays, when remaining at the point of origin, are known as "residual clays"; while "sedimentary clays" have been transported by streams and deposited from a body of water.

Although basically a chemical combination of alumina, silica, and water of hydration, clays generally contain also some compounds of iron, titanium, calcium, magnesium, potassium, sodium, and possibly manganese. The amounts of these extraneous materials vary from zero to quite high percentages in the case of low-grade clays. The ratio of silica to alumina content, which in kaolinite is 2:1, may range up to 6:1 or higher in bentonite and largely determines the characteristic properties of a clay, such as plasticity, heat of wetting, etc.

The occurrence of rubber grade clays is fairly well limited to an area extending southwesterly in a narrow band from the south central portion of South Carolina into Georgia. Practically all of the commercial clay production in this country is located in that region.

Classification of Clays

Clays for rubber use are classified by the rubber technician as either "hard" or "soft." Clays that produce high modulus, high tensile strength, good resistance to abrasion, and stiff uncured compounds are called "hard" clays. "Soft" clays produce lower modulus and tensile, lower resistance to abrasion, and softer uncured compounds. This classification is arbitrary and has no connection with geological formation or chemical composition.

Hard clays give excellent resistance to abrasion in comparison with all rubber pigments except the carbon blacks. These clays therefore, are used extensively in all non-black rubber goods where resistance to wear is of importance. Notable examples are heels, soles, tiling, flooring, matting, footwear, bicycle tire treads, and belting. Hard clay also imparts stiffness to uncured compounds, thus finds use in the manufacture of hose, tubing, jar rings, and other extruded goods.

When it is desirable to use high pigment loading to reduce costs, and when abrasion resistance is not a paramount consideration, soft clay is used. Examples are tire bead insulation, bicycle tire carcass compounds, household goods, hard rubber goods, toys, and novelties. Larger amounts of soft clay can be incorporated and the extrusion rate is faster than when hard clay is used.

In certain types of extruded goods the small amount of mica present in all dry-ground air-floated clay causes trouble by collecting on the inner surface of the die. Water-fractionated clays which are substantially free from mica find application in such articles as small intricate tubing, refrigerator gaskets, and insulated wire made by the continuous vulcanization process.

Properties of Rubber Clays

The principal physical characteristics of rubber-grade clays can be enumerated briefly, as follows:

SPECIFIC GRAVITY. The specific gravity of rubber clays is 2.60.

SCREEN RESIDUE (GRIT). High-grade rubber clays should have as low a content as possible of coarse material, usually expressed as the residue failing to pass through a 325-mesh screen. While the amount of screen residue does not reflect the quality of the fine materials that pass through the screen, a high grit content is

[1] Presented before Northern California Rubber Group, Berkeley, Calif., Apr. 29, 1948, and Los Angeles Rubber Group, Inc., Los Angeles, Calif., May 4.

[2] Manager, development department, J. M. Huber Corp., New York, N. Y.

objectionable in that it reduces tensile strength, causes premature flex cracking, dulls trimming knives, and causes wear on mixing and processing equipment. Grit is also a source of dielectric failures in insulating compounds. The 325-mesh screen residue may vary in amount from a trace up to 3.5%. Clays properly selected and refined should not exceed 0.35% in screen residue.

An improved method for determining 325-mesh screen residue has already been described in the literature.[3] This procedure is more satisfactory than conventional methods because by the use of high-speed agitation and sodium pyrophosphate as a chemical peptizing agent the individual clay particles are wetted and flow readily through the screen, leaving behind the grit to be determined by drying and weighing. This method is accurate and gives reproducible results.

MOISTURE. Moisture is usually specified as 1% maximum in high-grade clays for rubber. True kaolinitic clays are not hygroscopic and absorb moisture totaling only about 1.3% in conditions up to as high as 90% humidity.

COLOR. The color of clays is of particular importance in the manufacture of light-colored rubber goods. This point is especially true in the production of large-volume items where variations in the shade of color of the product is most undesirable.

For purposes of comparing the color of a clay with a known standard, the two samples are placed side by side on a white background and pressed out with a flat spatula so that the two clays form a junction. Differences in color great enough to be reflected in a light-colored rubber stock can be detected at the junction point.

A more exact method of measuring differences in color involves the use of the General Electric brightness meter which measures the reflectance of the compacted surface of the pigment to be tested in comparison with a known standard which is rated 100. In the use of this method of evaluation, hard clays for rubber range from 74 to 78 in GE brightness; soft clays from 78 to 81; and water-washed clays usually fall in the 81 to 85 range.

Although the color of rubber clays is important, clays have very little covering power in a rubber compound. This condition is because the refractive indices of clay and rubber are so nearly alike. Table 1 compares the refractive index of clay with the indices of other light-colored rubber pigments of known covering power.

TABLE 1. REFRACTIVE INDICES OF RUBBER PIGMENTS

	Refractive Index
Rubber	1.52
Clay	1.56
Barytes	1.64
Lithopone	1.84
Zinc oxide	2.04
Titanium dioxide	2.76

PARTICLE SIZE. A fundamental difference between hard and soft clays is their particle size distribution. A good hard clay for rubber will usually run 80% or more, by weight, of particles two microns or smaller in size; while soft clays comparatively tested run around 56% or more of particles two microns or smaller.

Clay particles are composed of thin hexagonal plates. Since the particle size is determined to a considerable extent by the larger dimensions of the plates, it follows that two clay plates of the same size may cover an equal area, but be different in mass because of a difference in thickness of the plates. It is therefore possible for a given mass of two different clays, which microscopically appear to be composed of plates of the same size, to contain a greatly different number of particles because of a difference in thickness of the plates. This difference in particle shape probably accounts for the widely different characteristics in rubber of two clays whose particle size distribution may be the same.

WATER SETTLING. When dry, ground clays are suspended in distilled water by means of vigorous stirring and the suspension allowed to settle, the clay settles out as a continuous column leaving a clear supernatant liquid above the clay column (Figure 1). Investigation has shown that the coarser particles do not separate from the finer ones since the clay column is uniform from top to bottom as regards particle size distribution.

The height of a clay column after a 24-28-hour settling period gives a very good indication of the rubber reinforcing characteristics of the clay; the higher the clay column the higher the reinforcement. The best hard clays show a column height of 70-80% of the original clay suspension column height; soft clays, 35-45%; and fractionated clays, 35-47%. Some of the chemically treated clays do not settle in a normal manner and cannot be evaluated by this method.

pH. Pulverized, untreated clays shaken with water show an acid reaction. Dry, ground natural clays occurring in South Carolina and Georgia range in pH from 4.40 to 5.70; while specially prepared and treated clays may show pH values of 8.0 or higher.

Clays in Rubber Compounding

In discussing some of the compounding techniques of clays in natural and synthetic rubbers it should be pointed out that the hard clays retard or are slower curing than the soft clays and other pigments of comparatively larger particle size. For this reason it is well to accelerate adequately hard clay compounds, and in this respect the choice of the proper accelerator or accelerator combination is most important.

Table 2 illustrates the differences in physical properties obtained with hard, soft, and water-fractionated clays in natural rubber. The following test recipe pigmented with a 40-volume loading of clay was used:

NATURAL RUBBER TEST RECIPE

Smoked sheets	100
Clay	104
Zinc oxide	5
Sulfur	3
Stearic acid	2
Accelerator*	1.00 with hard clay 0.75 with soft clay 0.875 with water-fractionated clay

*A condensation product of hexamethylene tetramine, benzyl chloride, and 2-mercaptothiazole.

Cures were made in the range of 15 through 90 minutes at 260°F. and the following test results were obtained:

TABLE 2. EFFECT OF CLAYS ON VULCANIZATE PROPERTIES

	Tensile Strength,* P.S.I.	Abrasion Loss† CC./Hr.	Heat Generation, °F. (St. Joe Flexometer)‡	Compression Set, %§
Clay				
Hard	3,000	65	344	10.2
Soft	2,700	89	277	8.0
Water-fractionated	2,800	75	319	8.8

*Highest tensile in 15- through 90-minute cure series at 260° F.
†Goodyear-Huber abrader, average of 60-, 75-, and 90-minute cures.
‡75-minute cure.
§ASTM D395-46T, Method "B"; 75-minute cure.

The extrusion properties of the three types of clay in a series of loadings from zero through 80 volumes are given in Table 3.

The tensile values shown in Table 4 illustrate the reinforcement obtained with a high-quality hard clay using the natural rubber test recipe in the zero through 80-

[3] "An Improved Method for the Determination of the Screen Residue in Clay." C. A. Carlton, *Rubber Age (N. Y.)*, 45, 275 (1939).

volume series of clay loadings. The tensiles in each case are the highest obtained in a series of cures at 260° F.

TABLE 3. EFFECT OF CLAYS ON EXTRUSION RATE

Parts Clay per 100 Parts Rubber	Extrusion Rate, Cc./100 Sec., with Hard Clay	Soft Clay	Water Fractionated Clay
0	114	104	110
25	116	138	132
52	107	135	131
78	100	135	129
104	93	136	127
130	86	136	123
156	76	136	118
182	59	132	109
208	37	124	99

TABLE 4. CLAY LOADING VS. VULCANIZATE TENSILE STRENGTH

Clay Loading, Volumes	Tensile Strength P. S. I.
0	3,500
10	4,100
20	3,900
30	3,400
40	3,000
50	2,600
60	2,100
70	1,900
80	1,700

With synthetic rubbers, clays are among the best of the non-black pigments with respect to ability to reinforce. With general-purpose GR-S, the following recipe was used as a base for comparing hard and soft rubber clays with several other of the most common non-black rubber pigments in Table 5.

GR-S TEST RECIPE

GR-S	100
Zinc oxide	5
Sulfur	3
Turgum S	8.5
Accelerator*	2
Pigment	40 volumes

*N-cyclohexyl-2-benzothiazole sulfenamide.

TABLE 5. EFFECT OF PIGMENT ON GR-S PROPERTIES

Pigment	Parts Pigment per 100 Parts GR-S	Maximum Tensile* P.S.I.	Abrasion Index †%
Hard clay	104	2,000	100
Soft clay	104	1,250	92
Treated, precipitated calcium carbonate	108	1,200	61
Water ground whiting	108	630	70
Calcium silicate	91	1,390	66
Zinc oxide	225	1,060	110

*Highest tensile in 30- through 90-minute cure series at 280° F.
†Grasselli abrader; #2½ garnet paper; average of 60-, 75-, and 90-minute cures at 280° F.

Hard clay has been used extensively as a retardant for cut growth in GR-S tire treads. Various pigments have been compared in Table 6 for this property using a typical GR-S tread stock formulated as follows:

GR-S TREAD STOCK RECIPE

GR-S	100
EPC black	50
Zinc oxide	5
Sulfur	2
Accelerator*	1.5
Turgum S	8.5
Pigment	as shown

*N-cyclohexyl-2-benzothiazole sulfenamide.

TABLE 6. EFFECT OF PIGMENT ON CUT GROWTH OF GR-S TREAD STOCK

Pigment	Parts Pigment per 100 GR-S	% Cracked*
Control stock	0	76
Hard clay	10	11
Treated, precipited calcium carbonate	10.4	62
Water ground whiting	10.4	70
Calcium silicate	8.8	51
Zinc oxide	21.6	70

*Flexed four hours at 180° F. with Du Pont belt flex cracking machine; results are averages of 45-, 60-, 75-, and 90-minute cures at 280° F.

In neoprene and Butyl, hard and soft clays compare favorably with other common non-black pigments, as shown in Tables 7 and 8, respectively. The base test recipes for these two types of synthetic rubber are as shown below. Both series of compounds were cured at 287° F.

NEOPRENE TEST RECIPE

GR-M	100
Stearic acid	1
Neozone A	2
Extra-light magnesia	4
Zinc oxide	5
Pigment	40 volumes

BUTYL TEST RECIPE

GR-I	100
Zinc oxide	5
Sulfur	2
M-B-T	0.5
Tetramethyl thiuram disulfide	1
Stearic acid	3
Pigment	20 volumes

TABLE 7. EFFECT OF PIGMENT ON NEOPRENE PROPERTIES

Pigment	Parts Pigment per 100GR-M	Maximum Tensile, P.S.I.*	Tear Resistance, lbs./in.†
EPC black	56.64	3,580	435
Hard clay	83.2	2,240	304
Soft clay	83.2	1,850	230
Treated, precipitated calcium carbonate	86.4	1,450	234
Water ground whiting	86.4	1,680	137
Calcium silicate	67.2	1,570	332
Zinc oxide	179.2	1,780	233

*Highest tensile in 20- through 90-minute cure series at 287° F.
†Average of three highest results in same cure series as maximum tensile.

TABLE 8. EFFECT OF PIGMENT ON BUTYL PROPERTIES

Pigment	Parts Pigment per 100 GR-I	Maximum Tensile, P.S.I.*
EPC black	35.4	2,550
Hard clay	52	2,260
Soft clay	52	2,020
Treated, precipitated calcium carbonate	54	2,070
Water ground whiting	54	1,840
Calcium silicate	42	1,690
Zinc oxide	112	1,970

* Highest tensile in 15- through 90-minute cure series at 287° F.

Summary and Conclusions

Rubber clays are valuable compounding ingredients for natural and synthetic rubbers because of their ability to provide good reinforcing properties at relatively low cost. The lower its grit content, the better a rubber clay will perform in most instances. Particle size distribution and uniformity of color also contribute materially to the performance of clays in rubber. Especially in the synthetic rubbers are clays outstanding in reinforcement when compared with other non-black compounding ingredients.

Shipments and Consumption of Plastics and Resins

The following statistics represent the shipments and consumption, in pounds, of plastics and synthetic resins for the second quarter of 1948, as reported to the Bureau of the Census, United States Department of Commerce, by 28 manufacturing companies and company departments. Data on synthetic resins for protective coatings are not included.

	April	May	June
Cellulose acetate and mixed ester plastics*	5,425,677	5,087,514	4,080,554
Nitrocellulose plastics*	1,070,587	866,441	793,728
Other cellulose plastics*†	973,525	1,024,245	†
Phenolic and other tar acid resins:			
Laminating (dry basis)	3,388,327	2,724,236	3,494,319
Adhesives (dry basis)	1,697,513	1,578,613	1,208,645
Molding materials*	15,416,150	11,867,166	11,235,732
All other (dry basis)†	5,854,231	4,546,185	4,398,421
	26,356,221	20,716,200	20,337,117
Urea and melamine resins:			
Adhesives (dry basis)	4,451,024	4,304,704	3,582,257
Textile and paper treating (dry basis)	1,422,780	1,446,264	1,713,730
	5,873,804	5,750,968	5,295,987
Polystyrene†§	12,188,506	10,777,174	11,798,424
Vinyl resins:			
Sheeting and film*	7,467,905	6,350,610	7,193,864
Textile and paper coating (resin content)	2,937,881	2,318,445	2,088,520
Molding and extrusion (resin content)	6,725,444	5,679,994	4,311,978
All other, including adhesives (resin content)†	2,066,646	1,596,574	1,593,629
	19,197,876	15,945,623	15,187,991
Miscellaneous plastics and resins*†¶	8,219,200	8,489,833	9,007,769
TOTALS	79,306,396	68,657,998	66,501,570

*Includes fillers, plasticizers, and extenders.
†Excludes data for protective coating resins.
‡Cannot be shown without disclosing operations of individual establishments.
§Dry basis, including necessary coloring materials.
¶Includes data for urea, melamine, acrylic acid, and miscellaneous molding materials, petroleum resins, acrylic acid ester resins, resin mixtures and miscellaneous synthetic materials.

A Survey of Resilience and the Development of Resilient Compounds[1]

Robert F. Shaw[2]

THE replacement of natural rubber with synthetic elastomers had led to a search for a satisfactory resilient material from which to make packings for various hydraulic mechanisms.

This article covers the library research on resilience and incorporates the findings into actual test compounds and methods. Test data on these compounds are included and show the effect on resilience by the type of measuring instrument, the temperature at which the measurements were made, and the effect of compounding ingredients.

Definitions of Resilience and Related Terms

RESILIENCE—In a rubber or rubber-like body subjected to and relieved of stress, resilience is the ratio of energy given up on recovery from deformation to the energy required to produce the deformation. Resilience for these materials is usually expressed in %. (54).[3]

HYSTERESIS—Hysteresis is the % energy lost per cycle or 100% minus the resilience percentage (54).

DYNAMIC MODULUS—The dynamic modulus is the ratio of stress to strain under vibratory conditions. It is usually expressed in p.s.i. for unit strain (dynamic spring rate) (54).

DAMPING—Damping refers to the progressive reduction of vibrational amplitude in a free vibration system. It is the result of hysteresis, and the two forms are frequently used interchangeably (54).

HEAT BUILD-UP—This is a term applied to the increase in temperature of a rubber specimen when subjected to forced oscillation. The greater the hysteresis, the greater will be the heat build-up.

IMPACT RESILIENCE—Impact resilience is a function of internal friction (the hysteresis effect) and dynamic modulus (50).

RESILIENCE—Resilience is a composite property dependent on hardness and internal friction (50).

REBOUND—This term indicates the % recovery of an object after it strikes the rubber specimen, or after a ball-shaped rubber sample strikes a hard surface.

FLEXOMETER—This term is applied to a machine which alternately subjects a rubber specimen to high-frequency cyclic compression, tension, shear, or torsional forces.

RESONANT VIBRATOR—This is the high-frequency dynamic fatigue tester which subjects a rubber specimen to vibrational forces that produce the greatest amplitude of vibration when the system is tuned to its resonant frequency.

Methods of Resilience Measurement

Resilience methods and machines have been classified on the basis of the way in which the rebound or recovery is determined. These methods have been given in the literature (1-3) and are in general as follows:

- Impact Resilience
  - Free falling
  - Pendulum
- Free Oscillations
  - Torsion
  - Extension
  - Compression
  - Shear
- Forced Oscillations
  - Flexometers
  - Dynamic oscillators
    - Resonant frequency
    - Non-resonant frequency
- Other Methods

Impact Resilience

Free Falling

The simplest method of measuring resilience is obtained by the dropping of a ball-shaped rubber sample and noting the vertical rebound from a hard surface (8). The opposite principle is employed by the elastometer of Breuil which allows a falling metal ball to rebound off a rubber specimen, and the rebound read off the scale on the enclosing glass tube(8, 55).

The falling ball test of Hock(8) measures the elasticity of rubber by the use of a falling metal ball on to a rubber specimen mounted on a slanting base and measuring the horizontal component of the rebound.

The Gaston falling ball resiliometer(4), the Shore scleroscope (3, 5), Williams elastometer(6), the Bashore resiliometer(7), and St. Joe inclined plane rebound tester(9) are all variations of the free falling method of determining resilience.

The Whitney rebound tester(10) indicates the % recovery of a spherical tipped metal weight sliding in a metal tube after being allowed to drop on a solid rubber object such as a solid rubber truck tire.

Pendulum

The principle of the pendulum hammer for measuring the elasticity of rubber was arrived at independently by van Itersen and Schob(8). The Schob pendulum as manufactured by Schopper(11) was released from varying points on a sector and the rebound determined by a pointer on a calibrated scale. A double-pendulum design was used to get the physical characteristics since such a system prevented loss of stray energy as the rubber specimen was struck simultaneously from opposite sides(8).

The Lupke impact resiliometer is based on the rebound of a metal rod of known weight, suspended as a horizontal pendulum, after striking against a rubber specimen held on a rigid anvil. The resilience is the ratio of the returned energy to the impressed energy and is written as a percentage (13).

The Dunlop-Healy pendulum (12, 39, 57) is a metal pendulum whose energy is transmitted to a rubber test block by a steel ball fixed to the leading edge. The dis-

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[1]The opinions or assertions contained herein are the author's and are not to be construed as official or reflecting the views of the Department of the Army.

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[3]Numbers in parentheses refer to bibliography references listed at the end of this paper.

placement corresponding to the height from which it is dropped is measured along a horizontal scale.

The Healy-Goodyear pendulum (14-16) is a modification of the Dunlop-Healy with the rebound indicated by an electrical device and a deflection indicator added to measure the penetration of the hammer into the test block.

Modifications as to size but using the same principle is employed by the pendulums of Barnett and Mathews (17) and Goodwin and Park (18).

Free Oscillation

Free oscillation instruments produce damped cycles of impressed amplitudes on the rubber samples held in torsion, extension, compression, or shear.

Torsion

The Mooney and Gerke torsional pendulum (19, 21) consists of a torsional pendulum mounted with a calibrated ring and supported entirely by the rubber specimen which furnishes the restoring torque. The ratio of the damped amplitude to the impressed amplitude gives the resilience.

The Firestone autographic pendulum (20) is a torsion pendulum that scribes a damped sinusoidal curve at the natural frequency of the rubber compound.

Extension

The extension resilience device of Cassie, Jones, and Naunton (22) consists of a torsion head which, when rotated, alternately stretches and relaxes the rubber sample held in an oven between a fixed and a movable clamp.

Compression

The free oscillation apparatus of Naunton and Waring (23) measures the amplitude of a pendulum whose fulcrum is held between two compressed rubber specimens. The moment of inertia of the system can be varied by means of a movable weight on the pendulum arm, which has a pen on the end to record the amplitude.

The Harris pendulum (26) is a vertical weighted arm suspended by the rubber sample and oscillates against rubber pieces so that the rubber contributes to the damping action as well as the spring constant. The pendulum is set in free vibration, the frequency recorded, and the resilience calculated.

Compression and Shear

The Yerzley oscillograph (24, 25, 54) consists of a balance beam supported at its center by knife edges. The test specimen, which may be in compression or shear, is placed between loading platens off center of the beam and supported by another knife edge and a stabilizing arm. The balance beam is loaded with standard weights to cause an unbalanced condition; the arm is released, and the cycling of the arm, as the rubber is alternately compressed and released, is recorded by means of a pen on a chronograph. The resilience in per cent. is defined as the vertical height of the rebound of the first cycle divided by the preceding height of fall and multiplied by 100. Values are reported for only the weight that causes a static compression of 20%.

Forced Oscillations

Flexometers

The Firestone flexometer, as described by Cooper (27), measures heat build up of a compressed rubber specimen under load when rotated off center between a stationary and a moving platen. The time required to "blow-out" due to the generator heat at a given speed, off center distance, and loading is an indication of the hysteresis and indirectly a measurement of resilience since 100% minus the hysteresis or energy loss gives the resilience.

The St. Joe flexometer (28) is a modification of the Firestone flexometer and also measures heat build up.

The Goodrich flexometer (29) measures the temperature rise of a compressed rubber sample when subjected to high-frequency cyclic compression of definite amplitude.

The Roelig dynamic fatigue tester (30) can be used in tension, tension-compression, or compression. The amplitude of the oscillation is measured, and the dynamic hysteresis loop is given by a mirror mounted on the mechanism which reflects a light onto a screen, and the image produced is photographed.

The Martens compressed ball rolling test or crushing tester (31) consists of two parallel circular iron plates; the upper is a driven rotating pulley; the lower is stationary and has a V-shaped groove in which a solid rubber test ball is rolled. The upper plate is rotated, and the blow-out temperature is recorded, or the inner temperature of the ball is determined after a definite rolling time.

Dynamic Oscillators

The high-frequency dynamic fatigue tester of Naunton and Waring (32) determines the modulus and resilience of rubber in compression when electrically driven at its resonant frequency. The forced oscillations produce the greatest amplitude of deflection at resonance which is obtained by adding weights to the vibrating member.

The Kosten compression method (33) measures static and dynamic properties of rubber under compression by steel springs, when confined by steel plates and subjected to vibrational forces of known magnitude and frequency below the resonance value.

The Goodyear forced resonance vibrator of Gehman, Woodford, and Stambaugh (34) deforms rubber in compression at the resonant frequency and enables the dynamic modulus to be determined by the amplitude of vibration. The method is similar to that of Naunton and Waring.

The Gehman forced resonance vibrator (35) is modified to test specimens in tension, compression, shear, or torsion under various superimposed static stresses.

The Gehman, Jones, and Woodford vibrator (36) is a variation of the Goodyear oscillator and vibrates at 60 cycles per second.

The Firestone forced resonance shear vibrator (2) deforms rubber at frequencies of 20 to 20,000 cycles per second, depending on the resonant frequency. The shear method is the most satisfactory since it eliminates any differences as to the size and the shape of the sample.

The Buick dynamic tester (37) is composed of a mechanical stoker, an electronic strain recorder, and a photographic recorder. It measures the hysteresis and damping rate of rubber held in tension compression or shear loading. Static tests and three dynamic tests are possible: (1) constant speed tests; (2) constant temperature; (3) endurance tests.

The vibrator of Moyal and Fletcher (38) employs an electrical driven oscillator which drives a steel bar with the rubber in compression in the center. The mechanical resonance of the system is found by observing the vibration of a point on the bar with a microscope.

The rotating unbalanced weight vibrator of Fletcher and Schofield (38, 44) utilizes an inertia-type piezoelectric pickup to record the amount of vibration caused by the unbalanced rotating member.

The Linhorst shear resiliometer (45) measures the amount of vibration transmitted through a mounting under varying temperature conditions by measuring the applied amplitude of vibration compared with the transmitted amplitude.

Other Methods

The Shore elastometer (48) yields a surface measured elasticity by subjecting the rubber to the semisharp penetrator point and reading the % recovery when the indicator hand is released.

The Taber stiffness gage (49) expresses resilience as the ratio of normal stiffness to initial stiffness where the normal stiffness is defined as the loss in stiffness due to fatigue as determined on the gage.

Factors Affecting Resilience

- Measurement
  - Duration of loading
  - Preworking
  - Temperature
  - Magnitude of the stress
  - Method of stress application
  - Amplitude of the deformation
  - Energy losses other than in the rubber
  - Frequency
- Sample
  - Shape
  - Thickness
- Material
  - Elastomer
  - Fillers
  - Plasticizers
  - State of cure

Measurement

Duration of Loading

The resilience may vary with the duration of deformation of the period of contact, and this variation will be most marked when the period during which the rubber being deformed is comparable to the orientation time since this short duration of deformation causes little energy to be lost in irreversible viscous flow (60). Resilience falls markedly with decreasing time of contact or decrease in ball size (61).

Preworking

Striking or flexing a rubber sample repeatedly increases the resilience to a constant value (13, 14, 19, 25). In all cases several cycles of loading and unloading should be performed before resilience readings are taken.

Temperature

The resilience of rubber samples is influenced both by the ambient temperature and the equilibrium temperature characteristic of the measuring instrument (3).

Resilience increases with increased temperature, and the rate of increase varies for different elastomers (6, 8, 14, 15, 19, 21, 22, 35, 41, 42, 44, 45, 52, 56, 59, 62).

Resilience decreases with lowered temperatures to a minimum and then increases somewhat with a further drop in temperature (56).

Instruments of the dynamic type increase the temperature of the specimen and give correspondingly higher values. Therefore, comparable results are obtained by having a standard specimen temperature preferably equivalent to service temperature and not ambient temperature (3).

Magnitude of the Stress

Resilience may be either increased or decreased as a result of increasing the magnitude of the applied stress. If impact energy is increased by increasing the mass of the striking body, the resilience increases. If the energy is increased by increasing the height of the drop, the resilience is decreased (1, 8, 13). Increased inertia of impact increases resilience, and increased velocity of impact decreases resilience when the Yerzley oscillograph is used (3).

Method of Stress Application

The type of applied stress affects resilience. Results are comparable only if measured in the same way, i.e., compression tension, torsion, or shear with the latter giving the highest values and being the most reliable (2, 3, 60).

Amplitude of the Deformation

The non-linear stress deformation curve of rubber leads to a dependence of the apparent elastic modulus on the actual value of the stress. The resilience will then vary with the applied stress and in a complimentary way with amplitude of deformation (60). This factor is dominant in instruments of the forced oscillation type. The effect of amplitude is not more than 2% or 3% in the Naunton and Waring oscillator (23).

Energy Losses Other Than from the Rubber Itself

The energy losses at the front and the back surfaces of the rubber sample are increased if bloom, chalk, or rubber dust are present (8, 43).

The effect of windage or air damping in the pendulum type is less than 1%, but the effect of shuffle or movement of the specimen can amount to up to 4% (17, 25, 43). Shuffle increased with pendulum energy and depth of impact and, in general, increased with increase of resilience.

The friction of the testing machine as well as vibration tends to lower resilience values.

Frequency

Resilience decreases when the frequency is increased (2, 23, 26, 34, 61). This change may amount to 5-15% when the frequency is increased several hundred cycles. Resilience reaches a maximum at some intermediate low frequency. It is best measured at the resonant frequency in forced oscillation tests since the amplitude is greater.

Sample

Shape

The area of the rubber test specimen has little effect on resilience (8). The shape of the sample in dynamic forced oscillation tests affects the resilience since the whole sample is subject to vibration. Similar shapes should have the same form factor, and the results of samples deformed in shear should be independent of the sample (2, 60).

Thickness

The thickness of the test specimen affects resilience most in the impact tests. If the ratio of the penetration to the thickness is high, the resilience is decreased. Resilience increases with decreased sample thickness up to ½-inch and then becomes constant (7, 8, 13).

Material

Elastomer

The type of elastomer used in a compound determines the limits of resilience since all other factors except temperature affect this property evenly for different materials. Natural rubber has the least change in resilience over the temperature range 32 to 212° F., with Neoprene

GX, GR-S, Buna N, and Butyl following in that order (41, 62, 53). Polymers high in butadiene content exhibit a minimum change in resilience over the range 32 to 212° F. When a portion of the butadiene is replaced with styrene or acrylonitrile, the low temperature resilience properties are impaired. However, acrylonitrile definitely contributes to improved resilience at elevated temperatures (62).

Room temperature resilience ranks the various elastomers in the order as shown in Table 1 (20, 50, 62).

Fillers

The effect of adding reinforcing agents or fillers to various elastomers is in each case to reduce the resilience. Pure gum stocks have the highest resilience, and resilience decreases directly as the percentage of filler is increased. In the case of carbon blacks, for equal loadings, the coarser carbons produce less change than the finer carbons (15-17, 40, 46, 47, 51, 61).

With increased loadings of carbon black, resilience properties of natural rubber and neoprene become more sensitive to temperature (51).

Plasticizers

The type and the amount of plasticizer used in a rubber compound affect resilience. The use of the smallest amount of a compatible softener aids resilience (63-65). Good softeners are tributyl phosphate, dibutyl phthalate, and dibutyl sebacate.

Softeners aid resilience at low temperatures since the hardness is reduced.

State of Cure

Resilience does not vary with time of vulcanization beyond the optimum cure (41, 62). This optimum cure, however, is usually longer or a decided overcure in regard to other properties such as tensile and elongation (64).

The resilience of GR-S and natural rubber are affected by the sulfur content of the compound. If the sulfur content is increased more than 3%, the stock becomes more temperature-sensitive (62).

In compounding, retarding materials should be avoided, and the acceleration increased in order to obtain "a tight cure" which enhances resilience (63-65).

Experimental Procedure

Test Methods

The following ASTM test methods were used in carrying out the experimental work in this program:

D15-41—Sample preparation for physical testing.
D412-41—Tension testing of vulcanized rubber.
D573-45—Aging, accelerated oven method.
D314-39—Hardness of rubber.
D395-40T—Compression set of vulcanized rubber.
D471-46—Changes in properties of rubber and rubber-like materials in liquids.
D736-43T—Brittleness, low temperature.

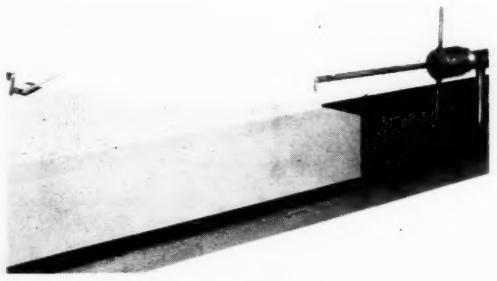

Fig. 1. Lupke Resiliometer

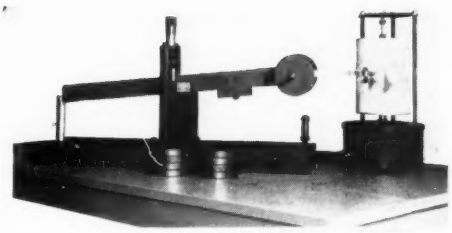

Fig. 2. Yerzley Oscillograph

Since there is no standard test method for determining resilience, the methods of Lupke and Yerzley were used.

The apparatus of Lupke was constructed in accordance with measurements given on pages 296-297 of the "Vanderbilt Handbook" (1942) and is shown in Figure 1.

The Yerzley oscillograph, as manufactured by the American Instrument Co. and as shown in Figure 2, was also used. The proposed ASTM standard (54) was followed in using the Yerzley oscillograph and measurements were made in a constant temperature-humidity room at 70° F. and 50% relative humidity.

M-1 Series of Compounds

Since neoprene was reported to have the highest resilience of all types of synthetic rubber, this material was used as the basis for the experimental compounding. The M-1 series was designed to show the effect of the various classes of carbon black when used in the amount of 15 parts per 100 of neoprene. The types of carbon blacks based on particle size were represented starting with the (MT) medium thermal furnace black which is the coarsest commercially available carbon black and continuing through decreasing particle size carbons up to (CF) conductive furnace carbon black. Another class of carbon black: namely, channel black, was not included in this study because of its adverse effect on resilience due to fineness of particle size.

M-2 Series of Compounds

The M-2 series was designed to show the effect on resilience of increased loading of carbon black on a neoprene compound. Thermax, which is a medium thermal carbon of large particle size, was used since carbons of this type decrease resilience the least. The proportions used were 15, 25, 35, 45, and 55 parts per 100 of neoprene.

The development of resilient compounds was the major goal of this study, but the other physical properties commonly used in evaluating rubber compounds were also determined. These properties include tensile, elongation, hardness, compression set, deterioration due to air oven aging, change in properties due to oil immersion, low temperature flexibility, and mold shrinkage.

Results of Experiments

The inherent resilience of various elastomers, as gathered from the literature, is shown in Table 1. The values shown are the maximum attainable for the given polymer when tested by the rebound method at room temperature.

The M-1 series of compounds is shown in Table 2. The following results are shown in this table:

The Lupke rebound decreases as the carbon black particle size decreases.

TABLE 1. INHERENT RESILIENCE OF ELASTOMERS

% Recovery (Room Temp.)	Elastomer
100	
95	
90	Natural rubber
85	Neoprene
80	"Thiokol" ST
75	
70	GR-S
65	Buna N (low acrylonitrile)
60	
55	
50	
45	
40	Buna N (high acrylonitrile)
35	
30	Butyl

Lupke rebound decreases with increased loading.
Yerzley resilience decreases with increased loading.
Compression set decreases with increased loading.
Mold shrinkage decreases with increased loading.
Oil swelling decreases with increased loading.
Shore hardness increases with increased loading.
All compounds are flexible at —65° F.

Table 4 presents comparative data on compounds suitable for use as packings. Natural rubber stock #34 has been in service for the past 10 years.

Compounds 407 and 407F both have higher resilience values at comparable hardness than the natural rubber compound. This condition is due to the fact that the

TABLE 2. PHYSICAL PROPERTIES M-1 SERIES

Compound No.	M1	M1F	M1F1	M1F2	M1F3	M1F4	M1F5	M1F6
Original								
Class of carbon black	MT	FT	SRF	HEF	HMF	ACET.	FF	CF
Name of carbon black	Thermax	P-33	Gastex	Sterling K	Philblack A	Acetylene	Statex B	Statex A
Cure time, min. @ 307° F.	25	25	25	25	25	25	25	25
Tensile, p.s.i.	3000	2550	2680	2710	2750	2720	3040	2930
Elongation, %	925	935	840	865	835	885	880	920
Shore hardness	46	46	53	52	53	56	50	50
Lupke rebound	73	72	67	66	64	63	65	66
Yerzley resilience @ 20% compression	80	79	72	72	70	69	70	71
Compression set, ASTM Method "A"	8.8	8.8	8.7	7.9	8.7	7.5	9.1	10.7
Aging Tests								
Air oven, 70 hrs. @ 212° F.								
Tensile, p.s.i.	2175	2165	2150	2315	2490	2405	2675	2875
Elongation, %	795	775	800	800	755	810	820	845
Shore "A"	50	50	50	51	53	55	52	54
808 Oil, 7 Days @ 158° F.								
Tensile, p.s.i.	2085	2040	2110	2150	2235	1975	2140	2175
Elongation, %	740	745	750	750	770	680	775	720
Shore "A"	38	39	40	41	42	41	40	38
Swelling Tests								
ASTM #1: % weight	—3.1	—2.9	—2.8	—2.8	—3.1	—2.5	—3.1	—3.5
% volume	—3.3	—4.2	—2.7	—2.8	—2.7	—2.1	—2.4	—3.5
808 Oil: % weight	14.9	13.6	13.9	14.6	14.1	14.7	12.6	15.1
% volume	25.8	23.4	23.7	24.4	28.9	26.3	29.4	28.2
SR 10: % weight	10.2	11.9	13.9	13.3	12.6	13.0	11.8	14.6
% volume	31.9	26.5	30.7	28.5	27.6	28.3	27.0	30.0
SR 6: % weight	91	89	94	89	92	85	91	91
% volume	150	149	115	152	153	147	152	155

TABLE 3. PHYSICAL PROPERTIES M-2 SERIES

Compound No.	M2	M2P	M2F1	M2F2	M2F3
Original Tests					
Parts Thermax	15	25	35	45	55
Cure time min. @ 307° F.	25	25	25	25	25
Tensile, p.s.i.	2080	1952	1986	1840	1724
Elongation, %	750	730	720	700	570
Shore hardness	54	55	56	60	62
Lupke rebound	78	77	76	75	72
Yerzley resilience @ 20% compression	86	85	83	82	79
Compression set, ASTM Method "A"	6.2	5.3	5.3	4.8	4.4
Flexible at ° F.	—65	—65	—65	—65	—65
Mold shrink, inches/inch	.024	.023	.022	.021	.020
Aging Tests					
Air oven after 70 hrs. @ 212° F					
Tensile, p.s.i.	1676	1530	1653	1683	1745
Elongation, %	570	500	503	403	380
Hardness	58	60	62	66	70
808 Oil immersion, 7 days @ 158° F.					
Tensile, p.s.i.	1550	1750	1800	1730	1660
Elongation, %	620	650	660	650	520
Hardness	47	46	48	50	51
Swelling Tests					
ASTM # 1 % weight	—3.2	—2.2	—2.8	—1.2	—1.2
% volume	2.8	1.1	—3.4	—4.6	—1.1
808 Oil: % weight	15.0	13.0	13.0	11.6	11.6
Recoil % volume	17.2	19.0	11.0	19.0	7.5
SR 10: % weight	18.0	13.0	17.0	11.6	11.0
% volume	36.0	30.0	30.5	33.8	23.0
SR 6: % weight	62.5	62.0	57.0	46.0	43.0
% volume	93.0	65.0	65.0	50.0	40.0

The Yerzley resilience decreases as the carbon black particle size decreases.

Hardness increases with increased carbon fineness.

The Yerzley resilience values average six points higher than the Lupke.

The following results are obtained from the data shown in Table 3 on the M-2 series of compounds:

The resilience values have been increased six points by changing the accelerators and the antioxidants to the M-2 formulation for equivalent carbon loadings.

Tensile strength decreases with increased loading.

Per cent. elongation decreases with increased loading.

TABLE 4. COMPARISON OF COMPOUNDS SUITABLE FOR FLOATING PISTON PACKINGS IN RECOIL MECHANISMS

	407 (M2F3)	407F	#34
Polymer	Neoprene	Neoprene	Natural
Type carbon black	Thermax	Gastex	Gastex
Class carbon black	MT	SRF	SRF
Parts carbon black	55	55	40
Parts mineral filler	0	0	106
Cure time, min. @ 307° F.	25	25	18
Original			
Tensile, p.s.i.	1724	2410	1850
% elongation	570	400	430
Shore hardness	62	70	68
Lupke rebound	72	69	62
Yerzley resilience	79	76	69
Compression set, ASTM method "A"	4.4	4.0	2.6
Low temperature flexibility @ °F.	—65	—65	—75
Aging test	70 Hrs. @ 212° F.		7 Days @ 158° F.
Tensile, p.s.i.	1745	2182	1810
Elongation, %	380	227	330
Shore hardness	70	81	73
Corrosion tests			
10 days @ 158° F. against silver	OK	OK	Tests not made
Steel	OK	OK	Service OK

TABLE 5. COMPOUND FORMULATIONS

	M-1	M-2	#34
Neoprene GR-M 10	100	100	...
Pale crepe	...	...	100
Light calcined magnesium oxide	7	7	...
Zinc oxide	1.5	1.5	44
Phenyl-alpha-naphthylamine	...	2	...
Phenyl-beta-naphthylamine	2	...	1.5
Para-phenyl-phenol	...	1	...
Di-ortho-tolyl-guanidine salt of dicatechol borate	...	2	...
Di-ortho-tolyl guanidine	2	...	...
Mercaptobenzothiazole	...	...	1
Tetraethylthiuram disulfide	...	...	5
Tellurium	...	...	2.5
Stearic acid	0.5	0.5	1.5
MF carbon black	15	15	...
SRF carbon black	...	...	42
Whiting	...	...	62
Paraffin	...	...	1.5
Dibutyl sebacate	10	10	...
Cure min. @ 307° F.			
0.080" test pad	25	25	18
0.500" button	45	45	30

rubber compound has a high loading of mineral filler which reduces the resilience. With proper compounding, the natural rubber stock could be made to have higher resilience than the neoprene.

Other physical properties of the neoprene compounds are equal to or superior to the natural rubber compound. The only exception to this statement is that the natural rubber compound has slightly better low-temperature flexibility. The aging values show the neoprene to be better for high-temperature service since natural rubber does not age well at temperatures up to 212° F.

Compound formulations of the mixes tested are shown in Table 5. The M-1 is the parent batch of the first series which features eight classes of carbon blacks as shown in Table 2. The M-2 is the parent batch of the second series which features increased carbon black content as shown in Table 3.

Table 6 shows the classification of carbon blacks by particle size. The thermal, furnace, and acetylene carbons were the only type tested since the channel carbons produce low resilience.

TABLE 6. PARTICLE SIZE OF CARBON BLACKS

Classification	Symbol	Diameter Millimicrons
Medium Thermal	MT	250—500
Fine Thermal	FT	150—200
Semi-Reinforcing Furnace	SRF	70—90
High Elongation Furnace	HEF	60—70
High Modulus Furnace	HMF	50—60
Acetylene	Acet.	43
Fine Furnace	FF	36
Conducting Furnace	CF	36
East Processing Channel	EPC	30—33
Medium Processing Channel	MPC	25—30
Hard Processing Channel	HPC	20—25
Conductive Channel	CC	10—20

Summary

A study was made of the methods and machines used in measuring resilience and classified as being of the impact, free oscillation, forced oscillation, or other type. A search of the literature revealed that resilience is affected by numerous factors, such as temperature, duration of loading, magnitude of stress, method of applying stress, amplitude, frequency and energy losses during measurement; by shape and thickness of the sample, and by the state of cure, amount and type of plasticizer, amount and type of fillers, and the type of elastomer used.

A series of neoprene compounds was compounded, cured, and tested to determine the effect of various classes of carbon black on the resilience of the neoprene elastomer which is the most resilient commercially made rubber material. The resilience was found to decrease as the carbon black particle size decreased.

A second series of compounds utilizing 15, 25, 35, 45, and 55 parts of medium thermal carbon black based on the neoprene were tested, and results show that resilience decreases with increased loading.

A comparison of the physical properties of these compounds with those of the currently used natural rubber packing shows that the former are superior for replacing the natural rubber in mechanisms.

The neoprene compounds possess better tensile, elongation, resilience, aging, and oil resistant properties, but are slightly inferior in low-temperature flexibility than the rubber compound.

Acknowledgment

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(Continued on page 868)

Rubber from Goldenrod—II

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THE following installment concludes the interesting and informative article on rubber from goldenrod, written by members of the Southern Regional Research Laboratory, United States Department of Agriculture, which was begun in our August issue.

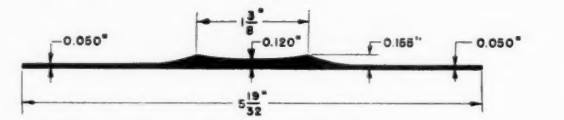
Manufacture of Miscellaneous Commercial Articles

Various commercial objects including heels for shoes, hot water bottles, small sample tires for use with ash trays, and rubber-impregnated belts were prepared on factory equipment for the primary purpose of testing the processing practicability of precured goldenrod rubber. It was found that these objects could be made using factory equipment.

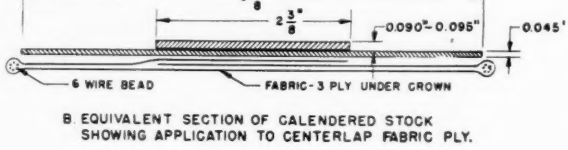
For making the small sample tires, approximately 26 pounds of precured rubber were fully compounded using a tread stock formula and were then formed for molding at one of the major rubber companies by extrusion in a factory-type tubing machine. The product was molded without difficulty in a nine-place gang mold to produce 30 of these samples.

A four-inch cotton belt impregnated with goldenrod rubber was installed in March 1945 on the inner driving pulley of a Carver peanut huller. Although the huller was not used continuously, loads as high as 3,000 pounds have been handled. After 2½ years of service this belt compared favorably with other similar-type belts.

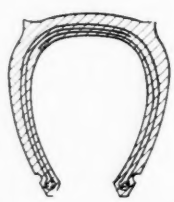
To carry the processing to an even larger scale, so as to determine conclusively the practicability of handling appreciable amounts of goldenrod rubber in regular factory operations, a factory-scale production run of



A. TUBED BICYCLE TIRE COVER SECTION.



B. EQUIVALENT SECTION OF CALENDERED STOCK SHOWING APPLICATION TO CENTERLAP FABRIC PLY.



C. APPROXIMATE MOULDED SECTION OF FINISHED TIRE.

Fig. 4. Construction of Chain Tread Bicycle Tire Casing

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TABLE 9. FORMULATION AND TEST DATA ON BICYCLE TIRE STOCK

Formulation Studies on Laboratory Scale*

Batch No.	1	2	3	4	5	6	7	8	9	10
Goldenrod (precured)	111.45	111.45	111.45	111.45	111.45	111.45	111.45	111.45	111.45	111.45
Sulfur	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90
Thiotax	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
D.P.G.	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Zinc oxide	5.50	5.50	5.50	10.00	17.50	25.00	10.00	10.00	10.00	17.50
HMF Black (Kosmos 40)	50.00	100.00	150.00	50.00	50.00	50.00	50.00	50.00	50.00	.....
EPC Black (WYEX)	.....	.....	.....	.....	.....	.....	.....	.....	.....	25.00
SRF Black (Gastex)	.....	.....	.....	.....	.....	.....	.....	.....	.....	25.00
Magnesium oxide	.....	.....	.....	.....	.....	.....	5.00	10.00	15.00	.....
Shore hardness	65	85	94	64	66	65	62	64	65	66
Tensile strength (p.s.i.)	1970	1320	1090	1200	1960	1960	1690	1810	1710	1950
Elongation (%)	540	160	70	320	460	440	460	510	500	470
Comments on milling	Sticky	O.K.	Dry & Leathery	O.K.	O.K.	O.K.	Sticky	Sticky	Very Sticky	O.K.

Physical Test Data on Factory-Mixed Stock†

Curing Time (Min. at 307° F.)	3	5	8	10	15
Tensile strength (p.s.i.)	2000	2030	1950	2160	1870
Elongation (%)	650	550	470	510	470
Modulus (200%)	400	525	605	730	535
Modulus (300%)	725	895	1050	1215	1010
Modulus (500%)	1490	1860	.....	2160	....
Shore hardness	60	62	66	65	64
Tear (lbs./inch thickness) ‡	9.6	9.6	5.5	4.9	4.2

* All laboratory samples cured 8 mins. at 307° F.
† Formula used—identical with that used in laboratory batch No. 10.
‡ Tongue, *Ind. Eng. Chem. (Anal. Ed.)*, 1, 17 (1929).

TABLE 10. WHEEL TEST OF GOLDENROD BICYCLE TIRE CASINGS

Tire No.	Brand No. Chain	Size	Fabric	Beads	Special Features	Mileage	Ave. Mileage	Failure
1	500	26x2.125	1433-28f² 65109	25014	Blistered tread and high bead	1577		Fabric broken at flexing line
2	500	26x2.125	1433-28f² 65109	25014	Mashed bead	1447		Fabric broken at flexing line
3	500	26x2.125	1433-28f² 65109	25014	Mashed bead	1062		Fabric broken at flexing line
							1362	

NOTE: No indication of failure at any of the tire defects, i. e., blistered tread, high and mashed beads.
CONCLUSION: This test shows "goldenrod" rubber tires to be better than "reclaim" or "prewar crude rubber." Construction of the same line class. (Based on mileage.)

Reclaim—approximately	450 miles
Prewar—approximately	700 miles
Goldenrod—approximately	1362 miles

bicycle tires was undertaken in cooperation with one of the major rubber companies. The fabrication of bicycle tires, although involving all the operations of automobile tire manufacture, can be carried out with as little as 100 pounds of rubber. Precured rubber in the amount of 170 pounds was submitted for formulation studies and for making 55 of the tires. In Figure 4 are given details of the construction of the tires made. Tables 9 and 10 give formulation and physical test data on these tires and the results of wheel tests. The results were considered good for an initial attempt at factory-scale processing. The advantages were that the stock had (a) excellent tack; (b) good molding properties; (c) fast-curing properties with safety in processing; (d) suitability for compounding readily; and (e) good tensile and elongation characteristics for the vulcanizates. Disadvantages were the special precautions needed to process; the fact that the stock became too soft and sticky on prolonged working so that it could not be extruded satisfactorily; and the fact that the batches were not uniform. As the work was not exhaustive, it is probable that some of these disadvantages could have been overcome either by different compounding or by modification of the preparation of the precured rubber.

The relatively high tensile strength, low hysteresis, good flex resistance, and excellent bonding of goldenrod rubber to fabric were reflected in the mileages indicated on wheel tests of three tires. These mileages, besides being three times that of reclaim casings then produced under war conditions, were nearly double those of prewar crude rubber casings. Several of the tires manufactured from goldenrod rubber were issued to private individuals for use on their own bicycles. The mileage on one set of these tires is reported already to be approximately 1,500. All of the tires, after two years of running under actual service conditions, are still in use.

Test Methods and Procedures Used at the V. L. Smithers Laboratories

Milling. The milling of the compounding stocks was done on a 12-inch laboratory mill, with diameters of the rolls six and seven inches, respectively. Exact temperature used during the milling of these various stocks is not available, but cooling water was circulated to prevent undue heat build-up during the milling cycle.

Mixing Procedure. Sufficient goldenrod rubber was used to fill adequately the mixing rolls to which were added the proper amounts of zinc oxide, sulfur, Thiotax, Statex B, and D.P.G. for the preparation of a masterbatch goldenrod tread stock. A GR-S tread stock was prepared in a similar manner by milling in the proper amounts of Bardol, zinc oxide, sulfur, Thiotax, and W-6 Black. The several blends of these stocks were prepared by mixing on the milling rolls the necessary amounts of each to secure the proper rubber proportions. Goldenrod gum stock was prepared in a similar manner to the tread stock except that no carbon black was added.

Curing. The curing was done in a single-opening press, using a four-cavity mold as specified by ASTM. Curing temperature for goldenrod gum and tread stocks was 260° F., for GR-S and the tread stock blends, 280°.

Stress Strain. This measurement was obtained on a Scott machine. Tests were conducted in an air-conditioned room maintained at 70° F. and approximately 50% relative humidity. Three samples were tested at each cure.

Heat Build-up. Results were obtained on a Goodrich flexometer, ASTM D623-41T Method A. The settings were: load, 143 pounds; stroke, 0.175-inch; and r.p.m., 1800. The samples were tested in an oven at 90° F.. Individual test cylinders one inch high and 0.7-inch in diameter were preconditioned for 30 minutes in the oven at the same temperature. Two samples were tested at each cure.

Tear Tests. Results were obtained according to the ASTM Designation D624-41T using Die A. Samples were tested both lengthwise and crosswise at each cure.

Resistance to Abrasion. Results were obtained according to the ASTM Designation D394-40 using Method A.

Resistance to Flex Cut Growth. The tests were made on a DeMattia machine according to ASTM Designation D430-40 Method B (modified). Using a No. 00 needle, a puncture was made through the center of the groove of the test specimen. Results are reported as the number of flexes necessary to produce a crack 0.8-inch long. Three samples were tested at each cure.

Pusey & Jones Indentation. Results were obtained according to ASTM Designation D531-41. Specimens tested were from cured slabs ½-inch thick and 2½-inches square. Temperature of testing room was 78° F.; a ball ⅛-inch in diameter was used.

A.S.T.M. Hardness. Results were obtained according to AS TM Designation D314-39. Specimens tested were from cured slabs ½-inch thick and 2½ inches square. Temperature of testing room was 78° F.

Permanent Set. These tests were made on a Scott rubber tester at 78° F. A die ½ by two inches, as shown in ASTM D412-41 (Figure 2),[2] was used. Samples were stretched 350% (two to nine inches).

Rebound. These tests were made on a Goodyear-Healy resilometer, T-50. These tests were made in methanol, according to ASTM Designation D599-40T. Tests started at 55° C.

Aging. (1) Accelerated aging by the oxygen-pressure method was performed according to ASTM Designation D572-41. Samples were tested after 96 hours. Three samples were tested at each cure.

(2) Accelerated aging by the oven method was performed according to ASTM Designation D573-41, with the temperature raised to 158° F. Samples were tested after seven days. Three samples were tested at each cure.

(3) Air-pressure-heat tests were made according to ASTM Designation D454-41. Samples were tested after eight hours. Three samples were tested at each cure.

Plasticity. (1) Samples were tested on a Firestone plastometer at six pounds' air pressure warmed in an oven for 30 minutes at 180° F. Two samples were tested.

(2) Samples were tested on a Williams plastometer using two cc. of material at 70° C. Warm-up was 15 minutes; weight, five kg. Plasticity was measured after three minutes in the press, and recovery one minute after removal. Two samples were tested.

Summary and Conclusions

Rubber has been extracted from goldenrod on a pilot-plant scale. Selected strains of the variety *Solidago leavenworthii* were used. The method consisted essentially of a preliminary acetone extraction of the dried leaves to remove most of the resinous material before extraction with benzol to remove the rubber. The raw rubber obtained after evaporating the benzol was extremely soft and sticky and still contained a considerable amount of resinous material. In a preliminary check of results a major rubber company found that up to 30% of this product could be blended with GR-S and that it could replace up to 20% of *Hevea* with desirable results.

By using an acetone precipitation step on the benzol miscella followed by a precuring operation, a tougher and more easily handled raw rubber stock was obtained. Approximately 900 pounds of this material were prepared and used in the manufacture of various commercial objects on factory equipment. These objects included heels for shoes, hot water bottles, small sample tires for use with ash trays, impregnated belting and bicycle tires. The performance of these tires on plant testing wheels and in commercial use was held highly satisfactory.

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(*Continued on page 809*)

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Comparison of Synthetic and Natural Rubbers in Tires and Tubes, Mechanical Rubber Goods, Footwear[1]

Tires and Tubes

G. R. Smye[2]

MANY contradictions and differences of opinion will be found in the literature on the comparison of synthetic and natural rubbers in tires and tubes. The comments and opinions expressed in this paper are based on the experience in the tire industry of my friends and myself. Indeed, these opinions are not necessarily unanimously held, and it is well that they are not, for what progress can be made in any industry or project where everybody thinks alike?

In an attempt to avoid too much repetition between this paper and the succeeding ones on the general comparative properties and processing features of synthetic and natural rubbers, this paper will cover only the manufacture of tires and tubes and the operation of large internal mixers, extruders, cord calenders, curing equipment, etc.

Raw Materials

With the tire industry consuming about 80% of the total rubber used in Canada, the handling and storage of rubber is very important to the industry. In the field of natural rubber we have many different types which exhibit various physical characteristics and different degrees of cleanliness, uniformity of color, and uniformity of curing qualities. We think of No. 1X Ribbed Smoked Sheet as a good standard rubber for products such as inner tubes; pale crepe and gristly rubber for white sidewall compounds; fine Para rubber for providing strength in cement films; and the various ambers as processing aids in both tread and carcass compounds. This assortment would appear to be a grand variety of rubbers, each for its own special purpose. In synthetic rubbers, however, approximately 400 polymers have been tested, and nearly a quarter of this number have been put into worthwhile production. Thus a special GR-S can be hand-tailored for any special job. A good example is GR-S-10, the resin soap-type GR-S largely used in carcass compounds.

In handling and storing, GR-S and GR-I are far superior to natural rubber in all respects. Bales of natural rubber are clumsy and awkward to handle. They are frequently distorted and hence difficult to pile and store. Synthetic rubber bales keep their shape much better, are uniform in size and weight, and lend themselves readily to handling by means of pallet and power trucks, thus being warehoused neatly in a minimum of time and space.

The outside layers of natural rubber bales are frequently very dirty. When the bales are covered, the covering is often hard to remove; whereas when they are shipped uncovered, dirt works into the folds of the rubber. Exclusive of outside contamination, natural rubber is variable in cleanliness, with bits of sand and bark present in even the premium priced grades. Synthetic rubber, exclusive of outside contamination, is generally uniformly clean. (At times we have found pieces of machinery embedded in GR-S bales.)

Natural rubber freezes easily and necessitates the use of a large-capacity thaw room or an extra trucking and piling operation between unloading the cars and arrival at the bale cutter. The aging of natural rubber for several years in normal storage has had little effect on the material. We do not know too much as yet about the aging of GR-S, and a long period of storage aging may affect the processing of GR-S more than it does natural rubber. Owing to the relatively short haul between producing center and consumer, normal storage is satisfactory for synthetic rubber.

Processing Characteristics

PLASTICATING, MASSING, OR PRELIMINARY BREAKDOWN. Natural rubber bales require cutting or splitting before processing since they will not fit into the No. 11 Banbury, the most commonly used size. When medium sized plasticators are used, both GR-S and natural rubber bales require splitting. We frequently hear that GR-S requires more power than natural rubber in the plasticator. In our 15-inch plasticator we find that we can plasticate more GR-S AC per hour and use less power than with either smoked sheet or Nos. 2 or 3 amber rubber. In the No. 11 Banbury, GR-S requires considerably more power than does natural rubber.

MIXING. GR-S requires 10-12% more power than does natural rubber during the mixing process. At about the same time that GR-S was being used in large volumes, labor efficiency began to fall; hence much criticism was directed at the mixing behavior of synthetic rubber. Now that we are again using more natural rubber, we agree that synthetics (both GR-S and GR-I) are much less scorchy than natural rubber. We therefore have an appreciably greater safety factor in processing synthetics. In addition, general processing is less variable with synthetics. This statement, however, is not intended to give the impression that there is not room for improvement. To get efficient incorporation of pigments into GR-S and GR-I on a production volume basis it has been necessary for all tire plants to use Banbury mixers. Formerly many tire and tube stocks of natural rubber were well handled by open mill mixing. Even in the Banbury some mineral fillers are hard to work into the synthetics. New techniques, such as upside down mixing, have been developed to improve pigment dispersion in synthetics, and some of these techniques are now used for processing natural rubber. Batched-off slabs of GR-S compounds require minimum treatment to prevent their sticking together when piled.

CORD CALENDERING. Because of the tougher nature of GR-S, greater calender crowns are advantageous in calendering GR-S on cord fabric. This condition, how-

[1] A three-paper symposium presented before the Rubber Division, Chemical Institute of Canada, Montreal, P. Q., June 9, 1948.

[2] Chief chemist, Firestone Tire & Rubber Co. of Canada, Ltd., Hamilton, Ont., Canada.

ever, is not always possible since many calenders alternate several times daily between GR-S and natural rubber stocks. Because of its deader nature GR-S stocks tend to show less blisters than do natural rubber stocks. With increased use of GR-S in carcass stocks it became necessary to adopt rayon for truck and bus tires. The poor adhesion of GR-S stocks to rayon necessitated the use of dipping solutions or dispersions of the rubber on the rayon prior to calendering. In some cases the mixing of natural rubber with GR-S skim stocks is sufficient to improve this adhesion without the added dipping operation. Higher calender and wind-up temperatures can be employed with GR-S skim stocks than with natural rubber stocks because of the latter's more scorchy nature.

EXTRUSION. GR-S stocks, as a rule, do not extrude so smoothly as natural rubber stocks. But, with certain newly developed carbon blacks, such as Philblack, exceptionally good extrusion of GR-S can be achieved. Some companies find that GR-S stocks require less warm-up for tread tubing than do natural stocks; while other companies report that GR-S tread stock requires as much as 50% more mixing and breakdown work to effect equivalent extrusion. In my company we find that we can extrude considerably more poundage of GR-S tread stock per hour than we do natural rubber stock while using identical breakdown mills and manpower. GR-S stocks tend to "shrink" approximately twice as much as do natural stocks. However by specialized "choke" and pressure distribution in the extruder head this shrinkage can be greatly minimized. The "swell" of GR-S is considerably greater than that of natural rubber, and this can frequently be put to good advantage. In general, GR-S tread stocks are less touchy than natural stocks and can be extruded at higher temperatures. Very heavily loaded GR-S black stocks tend to set up quickly, particularly if the sectional area is very large, as in solid tires, and proper cooling cannot be effected promptly after extruding.

TIRE BUILDING. Because of its natural tack, cohesion, and adhesion, natural rubber is far superior to GR-S in tire building. GR-S skim stocks, however, when tackified with natural rubber cements, process satisfactorily and, in general, more uniformly than natural stocks. While some companies tied the cementing of calendered fabric directly in with the calender, others used a separate spreading unit. In either case it was an added operation and always a sloppy one. Mixtures of GR-S and natural rubber are in constant use which require no tackifying dip and process more uniformly than all-natural with respect to surface and building tack. It is surprising how much tack can be improved by the addition of even 25% natural rubber to the GR-S stock.

TIRE CURING. In general, GR-S results in higher cured scrap losses than natural rubber, but gives a decided improvement in reducing cured surface defects. Most companies use less lubrication on the surface of GR-S tires than they do with natural tires. Some companies report that even with extra lubrication natural rubber tires tend to have more light and cracked sides. The use of constant temperature jacket molds may aggravate this situation. Good results have been obtained by retaining GR-S stocks for sidewalls. Plugging and tearing of overflow vents present a far greater problem with GR-S than with natural rubber. Some companies report improved results when the tread and sidewall stock consists of a blend of GR-S and natural rubber. A good aging period between building and curing is advantageous with both rubbers.

The efficiency of curing equipment is about the same for both rubbers. Some companies use lower curing temperatures for natural rubber stocks, depending on the compounds and accelerators used. GR-S requires much higher ratios of accelerator content to RHC. Although GR-S as received is less variable in cure characteristics, the state of cure is more critical than with natural rubber and requires closer attention. Blowing between plies is aggravated because of the poor hot tear resistance of GR-S and necessitates the use of precooling periods before pulling heats. Jacket molds, particularly for larger tires, require cooling before GR-S tires are removed. In addition, if the bag extraction operation is severe, GR-S tires must be cooled before the bags are removed. The poor hot tear resistance of GR-S also leads to more ripped and snagged treads in the extracting of cured tires from the molds.

Inner Tubes

Tube production will be treated as a single subject in this paper, and the various operations will be grouped together.

Butyl rubber has the same advantages as GR-S over natural rubber with respect to size of raw bales, ease of handling and storage, cleanliness, and freedom from scorching. Raw Butyl does not require any washing or preliminary breakdown, but the storage of Butyl stocks throughout all processing steps is difficult because of its cold flow characteristics.

Butyl tube stock withstands much abuse during milling and tubing and extrudes more uniformly and slowly than does natural rubber. The breakdown or flattening of tubed green stock is much less with Butyl than with natural rubber. This condition is partly attributed to the greater carbon black loading in Butyl stocks.

In both lap and butt splicing Butyl is more sensitive than natural rubber and more difficult to handle. In general, defects in Butyl are harder to control than those of natural rubber; the defect of "stock grit" is particularly difficult to control or remedy. Butyl tubes require considerably higher curing temperatures or longer curing periods than do natural tubes.

We all know that the danger of contaminating Butyl compounds with natural rubber or GR-S is a serious one and presents a constant hazard in a plant using Butyl and any other rubber material.

GR-S is definitely unsatisfactory for inner tubes because of its inadequate tear resistance, excessive permanent set with resultant "creasing" deficiencies, and low resistance to bead toe chafing and cracking. Some complaint has been made of the difficulty in mounting Butyl tubes without buckling. The permanent set which Butyl tubes take in service results in oversized tubes when transferred from used tires to new ones. However tires also grow in service, although this growth is being greatly reduced by the use of low stretch cord. Besides natural rubber tubes after use will often be too large for new tires of the same size. Some time ago I. E. Lightbown, L. S. Verde, and J. R. Brown, Jr., presented a paper[3] on Y-15 tubes which showed less growth in service than did natural tubes.

Butyl is a very good inner tube rubber and gives (1) air retention approximately 10 times superior to that of natural rubber, (2) better tear resistance than natural rubber with resultant superiority when "run flat" in tires, and (3) better heat resistance and aging than natural rubber. These advantages, however, are not so great as is sometimes claimed, since natural rubber tubes have given satisfactory service under most condi-

[3] "Performance of Butyl Inner Tubes Influence on Tire Life," *Ind. Eng. Chem.*, 39, 141 (1947).

tions for many years. The one serious disadvantage Butyl possesses is its cold weather buckling and chafing, and this is the reason why natural rubber has replaced Butyl in many passenger tubes. With its superior air retention properties Butyl is a very desirable rubber hydrocarbon and will continue to find popularity in tires other than those used in extremely cold areas. In the meantime compounders are endeavoring to produce a Butyl compound having elastic properties more closely resembling those of natural rubber.

Physical Properties

In his paper [4] before this group L. V. Cooper stressed that when we went to synthetic rubbers, many old physical test standards considered proper for natural rubbers had to be scrapped and new standards developed. Ultimate tensile strength, for a long time the yardstick of rubber compound quality, is no longer adequate and is often impractical.

We know that much work is being done on new polymers. To date, natural rubber is superior to GR-S in tires because of its lower hysteresis and better abrasion resistance. Natural rubber also has better tensile strength, better resilience, and better tear resistance. Natural rubber treads also show better resistance to flex cracking and cut growth than GR-S treads do. On the other hand GR-S compounds show good aging properties. GR-S appears to be superior to natural rubber in sidewall performance and shows reduced radial cracking. The criticism of poor GR-S tire traction on ice and snow has been exaggerated by the public. In case of emergencies a reduction in tire air pressure will give noticeably improved traction.

Car manufacturers have compared the pull needed to propel their cars when using GR-S as compared with natural rubber tires. On the cold-room test wheels for Butyl tube testing at Sarnia a noticeable improvement was noted in the resiliency of the present 67% natural rubber tire over the former S-3 tire.

All GR-S tire stocks require carbon black to give minimum quality. Looking back now it seems almost more than coincidental that the various SRF, HMF, and other special types of blacks were just coming into their own when required in large amounts for GR-S.

Quality of Product

We have already discussed inner tubes. Except in the very cold weather areas where buckles and failures have discouraged motorists against Butyl inner tubes, we believe these tubes have been well received. Most of us take its low air loss for granted now and rarely think of having our tires checked regularly for air pressure.

GR-S tires were accepted as a reasonable substitute for natural rubber tires. Most people realized that GR-S tires were not perfect, that internal pressure had to be kept up, and that running flat for any distance soon produced loose cords and separated plies. One factor that helped the GR-S tire was the wartime reduced speed-limit law. Motor accidents were few, and when normal speeds were resumed, full confidence in GR-S passenger tires had been gained by the public. Now with the "S" markings a thing of history, the average motorist does not question the percentage of synthetic in a passenger tire.

Tires today are 10-25% superior to the best natural rubber tires made before the war. Considerable credit for this improvement is also due to changed construction characterstics, such as flatter and wider treads, lower stretch fabric, etc.

Those of us in the tire industry can look back four and five years ago when army "run flat" tires were being built, and a little later when the test field at Normoyle was started. There we learned just about how far we could go with GR-S in large tires where the superior physical properties of natural rubber showed up. J. J. Robson, of our parent company, who had much to do with testing army tires in combat service, reports[5] that almost all synthetic passenger tires stood up in the tests, but that the larger truck and bus tires, size 7.50-20 and up, chipped and chewed up badly. He found that it was impossible to overcome the excessive heat build-up in the larger synthetic truck and bus tires. The most severe service in the world was the Burma road where first-grade natural rubber tires gave only 2,500 miles of service and synthetic tires failed at about 1,500 miles. These conditions were, of course, very extreme.

Summary and Conclusions

In general, GR-S is not superior to natural rubber for many component parts and is definitely inferior in many cases. In some parts it gives very acceptable service.

Under present-day conditions we believe that a tire producing plant can operate very satisfactorily and produce top-quality tires on an overall ratio of approximately one part GR-S to two parts natural rubber. With the steady and constantly increasing amount of research work being done on synthetics we can look for many new developments in the future, such as Philprene, Ultipara, and other special low-temperature polymers.

Mechanical Rubber Goods

C. L. Brittain[6]

MANY processes and their attendant problems are common to all branches of the rubber industry, and I shall say as little as possible on these matters. Mechanical goods production differs from other branches of the industry in the wide variety of its products. It must carry a wide variety of compounds and, therefore, deal with a wide variety of behaviors.

Raw Stocks

In general, synthetic rubber stocks require a longer mixing time and more power than do natural rubber stocks. The synthetic stocks stick more to the rolls and have a greater tendency to run to the back roll. In frictioning, synthetic stocks deposit less on the fabric, and it is often necessary to add a skim coat to get a product comparable to that produced from natural rubber. GR-S stocks are undoubtedly less scorchy than natural stocks and on the average require longer cures.

[4] "Deformation Characteristics of Rubber or Rubber-Like Compounds as a Measure of Quality, Especially in Control.

[5] B. J. Lemon and J. J. Robson, "Ordnance Keeps Them Rolling." India RUBBER WORLD, 109, 463, 582 (1944).

[6] Superintendent, mechanical factory development department, Gutta Percha & Rubber, Ltd., Toronto 3, Ont.

Extrusion is a basic process in mechanical goods production. Early experiences were full of headaches; extrusion rates were slow, and extruded surfaces were rough. This difficulty was solved with the introduction of special grades of GR-S. The use of only a part special GR-S in either GR-S or natural rubber stocks gives smooth extrusions. In addition, GR-S extrusions hold their shape better than natural rubber extrusions.

Many mechanical rubber products involve hand building operations. In general, GR-S stocks are dryer than natural stocks and require more cement. At first frictioned ducks were practically all spread with rubber cement. Today, because of compound development, even all-GR-S frictions are seldom spread coated. Light-colored compounds, as for roll covering, when calendered at that proper gage and temperature to avoid blisters on the one hand and crowsfeet on the other, behave very well in rolling up.

In molding operations raw physical properties, such as plasticity, are critical. I have not discovered any general behavior differences between GR-S and natural rubber stocks. Molding difficulties, such as air traps, pock marks, blisters, back rinding, etc., show up with both stocks and seem to be specific to the compound.

Cured Compounds

Most mechanical rubber products require soft compounds, i. e., from 99 Shore hardness down. A high-grade pure-gum natural rubber compound will have the following properties:

Tensile strength	3,000 p.s.i.
Elongation	700%
Shore hardness	40
Compression set	40% (at 40% compression)
Resilience	80%

There is no comparable stock with GR-S. The closest approach is with a high black, high softener GR-S stock which shows the following properties:

Tensile strength	1,100 p.s.i.
Elongation	500%
Shore hardness	40
Compression set	60% (at 40% compression)
Resilience	40%

At the other or harder end of the compounding scale for soft stocks, in the range reinforced by carbon black, a natural rubber stock for, say, a very high-grade conveyer cover, will have these properties:

Tensile strength	4,000 p.s.i.
Elongation	630%
Shore hardness	60
Compression set	37% (at 25% compression)
Resilience	64%
Abrasion index	305 cc./h.p.hr.

A top-grade GR-S conveyer cover, however, will show the following properties:

Tensile strength	1,700 p.s.i.
Elongation	600%
Shore hardness	60
Compression set	35% (at 25% compression)
Resilience	40%
Abrasion index	240 cc. h.p.hr.

Desired physical properties can usually be obtained with either hydrocarbon in between these two extremes. GR-S, however, has one important limitation in that the attainment of top values in one property more often leads to a greater sacrifice of other qualities. The general usefulness of many GR-S compounds is therefore not so great. The same property considerations apply to light-colored as well as black stocks.

Products

It is obvious that the attainable physical properties of the compound dictate the products in which it can be used. It is only in the area of the two extremes (i. e., low Shore hardness, and high tensile strength and, in particular, high resilience) that you get into real trouble with GR-S in products which are perfectly satisfactory when made with natural rubber. Everyone making mechanical goods has had experience with this during the late period of severe wartime restrictions. Centrifugal pumps made with rubber linings and rubber covered impellers, used to handle water containing abrasives, are typical examples. The natural rubber compound customarily used is highly resilient, reinforced with channel black, and on some applications will give approximately six months' service. A similar installation with GR-S lasted about one week.

If 10 persons would list the articles which they believe can be made better with GR-S than with natural rubber, the lists would be very short. There would also be violent differences of opinion as to which articles can be made better with GR-S than with natural rubber. Many consider that better heat-resisting conveyer belting and steam packing can be made with GR-S. The special grades of GR-S, furthermore, will find continued use in extrusions.

The majority of mechanical goods requires compounds in the middle range of physical properties. When the compounds used are in this middle range, the resulting products, whether of GR-S or natural rubber, will be equally serviceable.

Miles of conveyer and transmission belting have been made with GR-S, and I have yet to find a service complaint where failure is attributable to the GR-S. The problem is one of proper use of materials. One cannot skimp with GR-S. All GR-S products which involve flexing must have an adequate amount of compound such as skim coats between plies.

The same general remarks also apply to hose. GR-S produces perfectly satisfactory hose for air, water, steam, etc. Processing difficulties will arise owing to lack of tack. Most service failures I know of have been occasioned by the difficulty of doing a really good building job in hand-made hose.

Comparative Costs

Today, therefore, we have sufficient experience to make many products of equal serviceability from either GR-S or natural rubber so that the main technical problem is one of comparative costs. In this there are three factors:

(1) The cost of the hydrocarbon itself.

(2) The costs of the two compounds being compared for the product. GR-S cannot just be substituted pound for pound for natural rubber in the same stock. A satisfactory stock must be developed with each rubber, and costs compared on that basis.

(3) Differences in processing GR-S as compared with natural rubber, including longer mixing, more power, extra calendering, extra building labor, and possibly the need of cements.

A comparison of costs is therefore rather complicated. No factory can afford to change back and forth frequently from natural rubber to synthetic. Neither is it economical to carry duplicate stocks using natural rubber in some lines and synthetic in others. Cost comparisons must therefore be made on the basis of a weighted average of all production over relatively long periods of time.

Footwear

A. B. Lewis[7]

SINCE many readers may be unfamiliar with the manufacture of rubber footwear, a brief review of the steps involved in making waterproof shoes will be of value.

As with the manufacture of any other rubber article, footwear processing begins with the processing and mixing of the rubber. Although the unit costs of Banbury mixing are generally considered cheaper than for mill mixing, my company favors mill mixing for a number of reasons. The second operation is calendering. Generally a 60-inch three-roll calender is used to friction and skim coat the fabrics used in the shoes. A smaller four-roll calender is used to run the gum stocks, such as soles, uppers, heel pieces, foxings, stays, etc. The fourth roll of this calendar is either plain or engraved and is readily interchangeable.

The soles are usually cut by machine. When only a small quantity of soles of an odd size is required, it is often cheaper to cut them by hand on a zinc plate using a metal template. The gum coated fabrics are cut with a clicker or beam press. For many types of shoes these linings are placed gum side down on to the outside upper stock which is fed face side down from reels on to a cutting conveyer. The excess is cut away by means of electrically heated knives, and the trimmed pieces are booked for delivery to the making conveyer.

The various footwear parts are assembled on the making conveyer. There are many types of conveyers, but the circular type is popular for making lighter weight waterproof footwear such as plain rubbers and rainettes. After being assembled and the parts rolled together, the shoes are taken to the varnishing booth where they are given a coat of vulcanizing varnish or lacquer and then loaded on cars. The loaded cars are run into the vulcanizer and cured under air pressure at about 260° F. for approximately 1½ hours.

Comparative Serviceability

It has been found possible, but not practical, to make a shoe using only GR-S hydrocarbon. Throughout the war some natural rubber was allotted for footwear manufacture. However, since the percentage of natural rubber required for adhesion is very small, all mentions of GR-S footwear in this paper will refer to footwear made predominantly from GR-S, but with sufficient natural rubber used for cements to give satisfactory adhesion of the shoe parts.

It has been our experience that GR-S footwear from a serviceability standpoint is comparable with natural rubber footwear. GR-S sole compounds wear very well, and GR-S uppers show excellent flex cracking resistance. Since GR-S does not melt and flow in cure like natural rubber, GR-S boots are more liable to leak, but, if the boots are properly made and inspected, this shortcoming should not show up in service.

Although it should not be classed under serviceability, there is a sales resistance against GR-S uppers on unvarnished boots because of their "deader" feel and lack of gloss. The resilience can be greatly improved by compounding, but at a substantial increase in cost.

Processing Costs

The "high black, high oil" compounding technique commonly used to kill the nerve in GR-S results in longer mixing cycles and in batches that are harder to sheet off the mill than natural rubber stocks. This result raises the mill room cost by approximately ⅓¢ a pound, or 1¢ a pound on the hydrocarbon used, since the average synthetic rubber footwear stock is about ⅓ GR-S by weight. This ⅓¢-a-pound increase in cost is made up as follows:

Direct labor	$0.25
Maintenance and depreciation	.05
Power consumption	.08
Total	$0.38 a pound of mixed stock

As far as calendering is concerned, GR-S stocks handle much better than natural rubber stocks. The former require less breakdown and are less sensitive to roll temperature. GR-S soling stock takes a perfect impression from the design roll and is easier to cut and roll on to the shoe than natural stock. It has been my company's experience that fewer "pulled" or "started" soles are obtained with GR-S than with natural rubber.

Although GR-S upper stocks calender nicely, they lack sufficient tack to permit assembling the parts of a boot or shoe without the use of natural rubber cement. This lack of building tack is the chief fault of GR-S stocks and results in an increased making cost of approximately 1¢ a pair for boots and ½¢ a pair on light shoes. The weighted average increase, based on mixed stock, amounts to ⅔¢ a pound for GR-S over natural rubber. On the basis of hydrocarbon mixed, the increased processing cost using GR-S is 2¢ a pound.

The total difference in processing costs of GR-S over natural rubber is therefore 1¢ a pound in mixing plus 2¢ a pound in extra cementing, making a total of 3¢ a pound in favor of natural rubber.

[7] Technical director, British Rubber Co. of Canada, Ltd., Montreal 32, P. Q.

TABLE I. TYPICAL SYNTHETIC RUBBER WATERPROOF FOOTWEAR COMPOUNDS

Ingredient	Ingred. Price, per Lb.	Soling		Upper		Lining Gum	
		Parts Ingred. per 100 RHC	Ingred. Cost	Parts Ingred. per 100 RHC	Ingred. Cost	Parts Ingred. per 100 RHC	Ingred. Cost
Polysar S	$0.190	100.	$19.00	100.	$19.00	100.	$19.00
Accelerator	1.100	1.00	1.10	1.00	1.10	1.25	1.37
Antioxidant	.520	.....	.....	1.00	.52	.....	.....
Sulfur	.026	3.00	.08	2.50	.06	2.50	.06
Zinc oxide	.120	5.00	.60	5.00	.60	5.00	.60
Lt. cal. magnesia	.280	.....	.....	3.00	.84	2.00	.56
Lime	.015	3.00	.04	.....	.....	.....	.....
Whiting	.010	.....	.....	.....	.....	75.	.75
Clay	.012	20.	.24	20.	.24	100.	1.20
SRF black	.053	140.	7.43	110.	5.84	.....	.....
Coumarone resin	.120	15.	1.80	10.	1.20	30.	3.60
Petroleum softener	.020	55.	1.09	25.	.50	20.	.40
TOTALS		342.00	$31.38	277.50	$29.90	335.75	$27.54
Specific gravity		1.30		1.29		1.50	
Cost per pound		$0.0916		$0.1078		$0.0820	
Cost per pound volume		$0.1190		$0.1390		$0.1230	

TABLE 2. TYPICAL NATURAL RUBBER WATERPROOF FOOTWEAR COMPOUNDS

Ingredients	Ingred. Price, per Lb.	Soling		Upper		Lining Gum	
		Parts Ingred. per 100 RHC	Ingred. Cost	Parts Ingred. per 100 RHC	Ingred. Cost	Parts Ingred. per 100 RHC	Ingred. Cost
Smoked sheets	$0.230	80.	$18.40	92.	$21.15	100.	$23.00
Whole tire reclaim	.080	40.	3.20	.....	.....	.....	.....
Shoe reclaim	.080	.....	.....	20.	1.60	.....	.....
Accelerator	.430	1.75	.75	2.00	.86	1.50	.64
Antioxidant	.520	0.75	.39	1.00	.52	.....	.....
Sulfur	.026	2.00	.05	2.00	.05	2.00	.05
Zinc oxide	.120	5.00	.60	5.00	.60	5.00	.60
Whiting	.010	70.	.70	70.	.70	100.	1.00
Clay	.012	30.	.36	10.	.12	20.	.24
EPC black	.075	15.	1.12	5.	.37	.....	.....
SRF black	.053	.....	.....	25.	1.33	.....	.....
Stearic acid	.220	1.00	.22	1.00	.22	1.00	.22
Paraffin wax	.134	.....	.....	.....	.....	1.00	.13
Process oil	.030	8.00	.24	2.00	.06	3.00	.09
TOTALS		253.50	$26.03	235.00	$27.58	233.50	$25.97
Specific gravity		1.41		1.41		1.44	
Cost per pound		$0.1027		$0.1173		$0.1110	
Cost per pound volume		$0.1450		$0.1655		$0.1600	
Price of natural rubber at which volume cost equals that of synthetic stock		17.15¢ lb.		18.25¢ lb.		17¢ lb.	
Weighted average price of natural rubber at which volume cost equals that of synthetic compounds				17.50¢ lb.			

Compound Costs

Since by far the largest percentage of boots and shoes made is black in color, only black compounds will be discussed in this paper. For further condensation, only three types of compounds: namely, sole, upper, and lining, will be considered since these three compounds consume approximately 90% of the total rubber hydrocarbon in footwear.

It is realized that the subject of compound costs can be highly controversial, but the natural and synthetic stocks shown in Tables 1 and 2 were found over a period of time to process satisfactorily and to give shoes of comparable wearing qualities.

Overall Costs

When one takes into consideration the ratio of light shoes and rainettes manufactured in proportion to boots and lumbermen shoes, and also the ratio by weight of the compounds used in different styles of waterproof footwear, one arrives at the figure of 17½¢ a pound for natural rubber to give equal compound costs by volume to compounds using synthetic rubber at 19¢ a pound, as indicated in Table 2.

Thus the use of GR-S in footwear on the basis of compound costs alone is favored over natural rubber by a differential of 1½¢ a pound.

Price Differential for Natural and GR-S Rubbers

In the discussion of processing costs it was estimated that, per pound of hydrocarbon used, it costs 3¢ more for synthetic than for natural rubber. On the other hand, in the discussion of typical compounds it was concluded that synthetic is cheaper than natural rubber by 1½¢ a pound. The net result, therefore, appears to be that GR-S must be available at 1½¢ per pound cheaper than natural rubber to make its use in footwear economical.

The point may be raised that only top-grade natural rubber has been referred to in making these cost comparisons; whereas the poorer grades can be purchased at considerably cheaper prices. However the major uses of natural rubber in footwear where it is of real advantage over synthetic rubber are those places where only high-grade rubber can be used, such as in uppers and linings. Lower grades of natural rubber are generally used in soling compounds where their sand contents and inferior aging qualities are not so important. In soles, however, GR-S has a considerable advantage over natural rubber with respect to calendering, cutting, and wear resistance.

With the current strong rubber market, the time is at hand when the return to heavy use of GR-S in footwear should be seriously considered. Had this paper been presented a few months ago when No. 1 Smoked Sheet was selling for approximately 16¢ a pound, the case against the use of GR-S in footwear would have been overwhelming. It should be pointed out that most companies continued to use GR-S during the period of low natural rubber prices. Many reasons existed for this usage of GR-S, including an appreciation of its stabilizing influence on factory costs by limitation of excessive fluctuations of the rubber market.

Naturally, factories are not going to change their compounds and processes every time the rubber market rises or drops a cent. It is up to management to decide at what point beyond the differential for equal economy it becomes profitable to warrant a sharp swing to natural or synthetic rubber. There is also the very practical approach of using both GR-S and natural rubber in compounds and applications to which each is best suited.

In my opinion GR-S footwear is definitely here to stay if GR-S can average 1½ to 2¢ a pound less in price than smoked sheet. If the building tack and resilience of GR-S can be improved, it would be preferred over natural rubber on an even cost basis for black waterproof footwear.

Rubber from Goldenrod

(*Continued from page* 803)

J. L. Hecker, L. J. Molaison, and Elsie T. Field, of the Engineering and Development Division, for the preparation of the goldenrod material for laboratory and pilot-plant solvent extraction, for purifying, vulcanizing, compounding, and testing the goldenrod rubber for preparation as reports or for publications, the results of the work of the Division; T. H. Hopper, E. L. Skau, J. D. Guthrie, and M. E. Jefferson, of the Analytical, Physical Chemical and Physical Division, for ensilage investigations and for analytical, physical chemical and physical analyses of samples found essential in conducting laboratory and pilot-plant work; T. L. W. Bailey, Jr., Mary L. Rollins, and Inez V. de Gruy, of the Cotton Fiber Division, for microscopical examinations of original goldenrod material, resins and rubber; and Nandor Porges, of the Sweetpotato Products Division, for retting investigations as an aid to rubber extraction from goldenrod.

EDITORIALS

Tight Rubber Supply Demand Situation Focuses Attention on Synthetic Rubber

THE consumption of 3,135,873 long tons of new rubber in the United States since the end of the late war, as compared with the consumption of 2,025,819 tons during the 1939-41 period, and the continuing high level of demand for tires, tubes, and most every other rubber product indicate the need of a re-examination of the estimates for supplies of natural and synthetic rubbers for the next several years. The rubber goods manufacturing industry is now inclined toward the belief that a new normal peacetime basis of sales is being established at recent levels, which are sharply higher than prewar normal sales because of this unprecedented demand for its products.

It is indeed fortunate that new estimates of world production of natural rubber by the Department of Commerce, which place the output for 1948 at 1,450,000 to 1,500,000 tons, 59,000 to 109,000 tons higher than the previous Rubber Study Group figure of 1,391,000 tons, seem likely of realization. United States consumption of new rubber is now expected to be between 1,050,000 and 1,100,000 tons for the year, and with foreign demand estimated at about 825,000 tons, a production of between 500,000 and 550,000 tons of synthetic rubbers in the United States and Canada will just about balance the supply at 2,000,000 tons against a demand of about 1,900,000 tons, when stockpiling plans of this country and other countries are taken into account.

The Rubber Act of 1948 specifies minimum required usage of synthetic rubber considerably below present consumption levels and also specifically states that mandatory use shall be no more than is necessary in the interest of national security. Although there is no evidence that stockpile purchases of natural rubber by the United States to date are less than desired, it was pointed out in this column last month that the government has emphasized its intention to adhere to the policy that stockpile requirements must receive first consideration, and the balance of the supply of natural rubber will then be available to private industry for its use.

If the amount of natural rubber available to private industry should become short in the near future, one or all of several things may occur: the price of natural rubber would undoubtedly rise, a greater voluntary use of synthetic and reclaimed rubbers should result, and the government could increase the mandatory consumption requirement for synthetic rubber. Most manufacturers of rubber products are not in favor of an increase in the mandatory use of synthetic rubber, but unless the amount of synthetic rubber used voluntarily increases more rapidly than it has in the recent past, the tight supply-demand situation for natural rubber may force an increase in the mandatory consumption figure for synthetic rubber.

In view of the above facts it would appear that private industry would have renewed interest in having plans for the disposal of some of the government's synthetic rubber production facilities formulated at an early date. Disposal plans will also require a modification of the government's patent pooling agreement, which modification has always been considered a necessary part of any new disposal program, if the program is to be a success.

The Rubber Act of 1948, when it became law on April 1, 1948, required that the agency of the government in charge of the production and sale of synthetic rubber should undertake immediate study, conduct such hearings as might be necessary, etc., in order to develop by April 1, 1949, a disposal program for those facilities not included in the 665,000 tons annual synthetic rubber production capacity "to be maintained at all times in the United States."

During the five months that have elapsed since April 1, 1948, there has been no mention of any study of disposal plans, nor has there been any announcement of hearings to be held in this connection.

The Act also directed the President to "take such action as may be appropriate with respect to patent pooling, patent licensing and exchange of information agreements entered into with the Government as a part of the wartime synthetic rubber program and, insofar as practicable and consistent with the purposes of this Act, to effectuate immediate cessation of further accumulation of technical information under the agreements dated December 19, 1941, as supplemented June 12, 1942, between the Government and others."

Here, again, no record of any action for modification of the patent pooling, patent licensing, and exchange of information agreements has been noted as of September, 1948.

In May, 1948, The Rubber Manufacturers Association, Inc., called attention to the fact that although the Rubber Act of 1948 was now law, the industry had a continuing responsibility to see that the interpretation and administration of the Act were properly and speedily accomplished. This fact was recorded and reemphasized in the editorial column of India RUBBER WORLD.

With the probable development of a tight natural and even synthetic rubber supply-demand situation, it would seem that the rubber industry should have more than the usual amount of interest in determining what has been done to implement those parts of the Rubber Act dealing with plant disposal and patent pooling and in cooperating with the government agency in the development of plans for future work that will provide a plant disposal program that will be completed in time to be of value to the industry. There are only about seven months before the disposal program is scheduled for completion, and the rubber supply situation may become quite difficult before the end of the first quarter of 1949.

DEPARTMENT OF PLASTICS TECHNOLOGY

Developments in Catalysis and Processing of Polyester Resins[1]

D. G. Patterson[2] and J. D. Robinson[2]

FOR the benefit of those who are not familiar with this subject, polyester resins in general are light yellow to water-white, 100% reactive liquids which are converted through exothermic reaction of their unsaturated linkages by means of an added catalyst into solid, virtually insoluble plastics. Depending on the type of resin used, these plastic products can be made with an almost unlimited range of properties from hard, rigid materials to those having a high degree of flexibility. The major usage for these resins today is in low-pressure laminating, although there is considerable activity in the casting and molding fields. The resins are shipped to the fabricators in a stabilized condition, and, just prior to use, the fabricator stirs in a predetermined amount of catalyst. This point is where the trouble begins.

Catalysis

In working with polyester resins a knowledge of the use of catalysts to meet the specific requirements of operation and end-product is very important. Insofar as the production of low-pressure laminates is concerned, improper curing of polyester resins, which is influenced to a large extent by catalyst type and concentration, will result in poor quality and certain characteristic faults.

Some of the effects of improper cure are pinholes, voids, poor bonding to filler fibers, a dry corky appearance inside the piece, and other faults that are well known to people who have used polyester resins. These effects are nearly always the result of an attempt to speed up production by use of too high a temperature for the specific conditions. It has been recognized that the catalyst used in polyester resins and, more specifically, the concentration of catalyst have a very important bearing on a satisfactory cure. The work described in this paper was started in an attempt to discover those variations in catalysts that would be acceptable under conditions of time and temperature specified by production requirements.

Exotherm Curves

The approach to this problem was made through an analysis of time-temperature (exotherm) curves for a large number of resin-catalyst systems. The curves were developed from 10-gram samples heated in a constant temperature bath at 80° C. The temperature of the resin was measured at regular intervals by means of a thermocouple and potentiometer. The results were plotted in curves which are modifications of the typical exotherm curve seen in Figure 1.

It must be recognized that the numerical values expressed by these curves will be valid only for this rigidly controlled test system. Similar curves, however, have been obtained during the curing of thin laminates and confirm the conclusions drawn from the test samples.

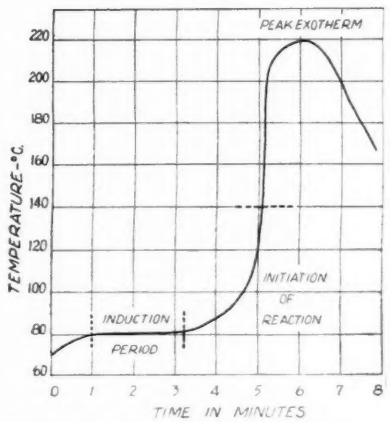


Fig. 1. Typical Exotherm Curve for a Polyester Resin-Catalyst System

The cure cycle of a polyester resin appears to consist of at least four significant portions:

(1) The induction period (the time used in heating the resin before any noticeable reaction takes place). This has been known as the gel time and is determined by the reactivity of the resin, inhibiter in the resin, concentration and type of catalyst used, and the temperature of the resin system. This time is waste time in application work, but must be maintained in part at least since it defines the stability of the resin in storage and also the catalyzed bath life of the resin. Too high a temperature during this period will shorten the time considerably, but will also give rise to too vigorous a reaction.

(2) The initiation of the exothermic reaction. At the end of the induction period a rise in temperature occurs which is more or less abrupt and appears to be quite important. A simple theory postulates that a large portion of monomeric styrene is bound during this period. If the temperature rises so rapidly that the vapor pressure of styrene becomes real before bonding takes place, the result will be "blowing" or production of a porous product. However, if the reaction is initiated rather slowly, the vapor pressure of the unpolymerized portion of the styrene is sharply reduced, resulting in a dense, continuous product. The speed at which reaction starts is also determined by the reactivity of the resin, catalyst type and concentration, and the temperature of the induction period.

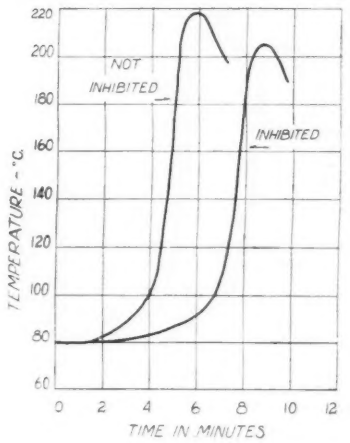


Fig. 2. Exotherm Curve Showing Displacement and Reduction in Peak Exotherm Produced by Inhibiter

(3) Peak temperature of reaction. Each resin system has a peak temperature of reaction which is a function of the reactivity of the resin, catalyst type and concentration, and the initiation temperature. In general, a slow, low temperature approach to the polymerization reaction results in a moderately low peak exotherm. A peak which is too low is not generally desirable since it results in a slow approach to complete cure of the resin. A high peak exotherm is necessary for fast cure, but must be combined with a moderate initiation temperature to insure good quality in the final product.

(4) Reduction of temperature following climax of reaction. This factor is important, but is generally determined by the peak temperature for the reaction. It is probable that in some copolymer systems considerable secondary reaction takes place during this phase. A high peak temperature will dissipate the heat in a short time with fast return to surrounding temperatures; while a low peak exotherm requires a long time to complete the cure. In practice, the temperature of the resin can be raised rapidly after the peak of the exothermic reaction is passed to obtain fast, complete cure with little danger of affecting the quality of the product.

Effect of Components

From the study of the exotherm curves a number of important factors was determined regarding the effect of each component in the resin system.

The inhibiter in the resin appears to have its major effect on the induction period of the cure cycle. Identical resin-catalyst systems normally inhibited and

[1] Presented before Low-Pressure Industries Division, Society of the Plastics Industry, Inc., Chicago, Ill., Jan. 16, 1948.

[2] Research laboratories, American Cyanamid Co., Stamford, Conn.

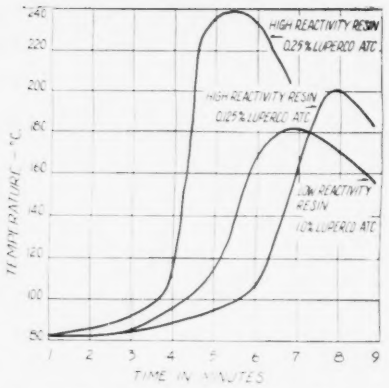


Fig. 3. Exotherm Curves Showing Effect of Catalyst Concentration in Relation to Resin Reactivity

with no inhibiter produce exotherm curves that differ in displacement; i.e., the induction period of the uninhibited system is much shorter than that of the inhibited resin system, and its peak exotherm is slightly higher (see Figure 2).

The inhibiter in polyester resins is established by each manufacturer. While reducing the inhibiter content shortens the induction period, it also decreases the stability of the resin in storage and materially reduces the catalyzed bath life.

The concentration of catalyst used should be inversely proportional to the reactivity of the resin (see Figure 3). For example, four times as much catalyst is required for one rigid-type resin as for another to produce the same degree of cure.

The effect of additional styrene in the resin is to produce a high peak exotherm, but a slower reaction rate. This condition does not mean that a high-styrene resin will not blow badly, for although the approach to the reaction is more moderate, the vapor pressure from the higher concentration of styrene becomes more important. The cure of resins containing fairly high concentrations of styrene should be started at the lowest practical temperature in order to reduce the effect of the vapor pressure as much as possible.

The temperature at which the resin system is heated to start the reaction has a very important effect on the intensity of the reaction (see Figure 4).

In general, our results have not indicated that any one catalyst is universally acceptable, or that the same curing cycle cannot be achieved from any of several peroxides normally used as catalysts. Different curing conditions, however, will have to be set up for each catalyst used.

Rapid cure can be achieved in one case by the use of high concentrations of catalyst and low temperature. In another case a considerably lower concentration of catalyst can be used with high temperature. In any event the requirement for quality in polyester use appears to be determined by the abruptness with which the polymerization reaction starts. The type of catalyst used determines the vigor of the exothermic reaction to some extent and also modifies the time of the induction period.

Our present opinion of the best operating procedure is to use those conditions which give a reasonably short induction period and a moderate approach to a reaction yielding as high a peak exotherm as is compatible with a good non-porous product. After the exotherm peak has been passed, sufficient heat can be applied rapidly to insure complete cure.

Room Temperature Catalysis

In the course of work on catalysis a group of peroxides was found to have the capacity of rapidly curing polyester resins at room temperature without the aid of externally applied heat. Promoters were previously used with conventional peroxides to initiate gelation at low temperatures, but in nearly all cases such systems have been highly colored, and their use has been limited correspondingly. Low-temperature catalytic peroxides, such as Laminac Catalysts 323 or 347, are not subject to this objection and should find a wider field of activity.

The significant effect of low-temperature peroxides is their speed of reaction, since nearly all peroxides will cure the polyester resins if given sufficient time. Table I demonstrates this relation:

Table 1. Comparison of Standard and Low Temperature Peroxide Catalysts

Catalyst	Gel Time of a Typical Polyester Resin at 25° C.	40° C.	80° C.
0.5% Benzoyl peroxide	10 days	24 hrs.	6 min.
1% Laminac Catalyst 323 or 347	2 hrs.	20 min.	5 min.

The gel time at 80° C. would undoubtedly be much more rapid in the case of Laminac Catalysts 323 or 347 except that the time of heating the test sample to reaction temperatures becomes very important in terms of the total time. Since this factor is equally important in actual polyester use, the relation expressed in this table is valid.

Room temperature catalysts react to the same variables and in much the same manner as conventional catalysts. The cures produced by room temperature alone are apt to be slightly less than complete unless rather thick sections are being dealt with. Since much of the value expected of the new catalysts will not come within these limits, the complete cure in these cases is achieved by stoving. It should be emphasized, however, that room temperature cures in thin sections are readily obtained with Barcol hardness values of 10 to 20, which permits easy handling of the pieces. Such partial cures take a number of hours, preferably overnight, at room temperature unless an undesirably large amount of catalyst is used. The full hardness or complete cure can then be obtained by stoving the piece in a warm area.

An indication of the scope of the system can be obtained from the following Table 2. Laminac Catalyst 323 was used at 25° C. to obtain the values with a typical polyester resin.

Table 2. Effect of Catalyst Concentration on Gel Time

% Catalyst	Gel Time
0.2	24 hrs.
0.4	8-20 hrs.
2.0	40-60 min.
6.8	10-15 min.

It is expected that the use of room temperature catalysts will increase the application of polyester resins in a number of fields. The specific applications are developing rapidly, but two important possibilities can be mentioned here.

Large castings, either filled or unfilled, are now possible from polyester resins. They can be prepared rapidly with very few strains and with little danger of cracking during cure. This is made possible by the smooth reaction which releases the heat of polymerization at a slow, controlled rate and without the development of color.

Since room temperature catalysis produces cured polyester resins at low temperatures, the resin does not flow during the curing cycle from the lower viscosity areas as when conventional elevated temperatures are used. The resin-rich surfaces produced as a result introduce a new advantage in polyester resin work. The effect is obtained when articles are cured in air where the resin flow is only sufficient to cover the irregularities obtained when the assembly is made. The value of this feature in obtaining large shaped polyester products is obvious and is expected to be important in future developments.

Summary and Conclusions

In conclusion, it has undoubtedly become apparent that we have done little more than scratch the surface on this subject of catalysis. Although we have not been able to include very much detail in this paper, a mass of such detailed information exists, and a concentrated program of laboratory work is constantly developing more data and making them generally useful. Our company will welcome any inquiries on this subject of polyester resin catalysis and will endeavor to assist in the solution of specific problems encountered in production.

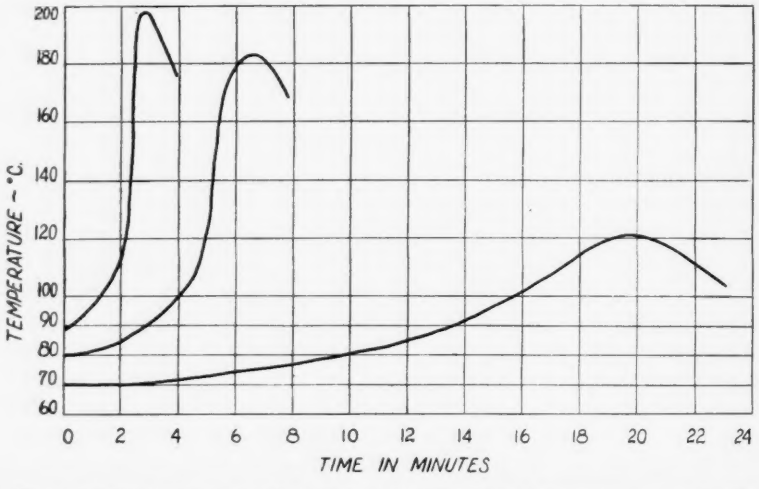
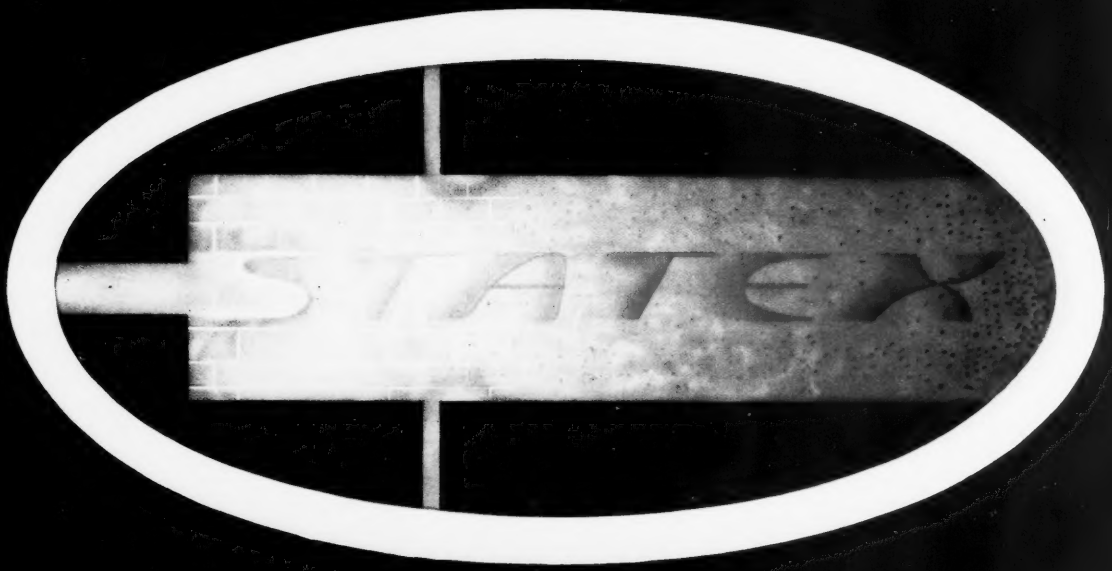


Fig. 4. Exotherm Curves Showing Effect of Induction Period Temperature on Intensity of Reaction



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Vinyl Paste Technology[1]

M. Scott Moulton[2]

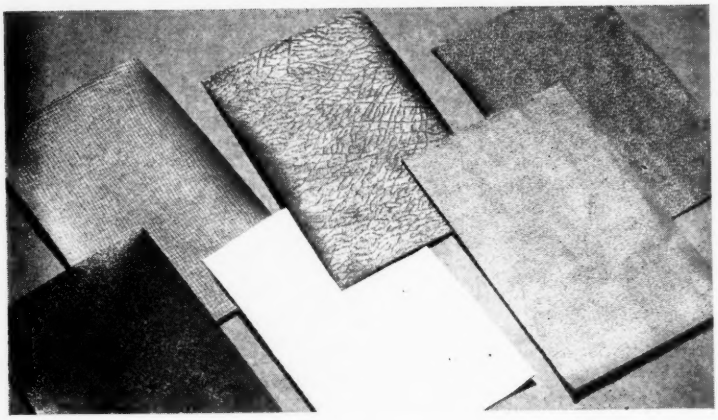


Fig. 1. Fabrics Coated with Paste Resin. Coating is 0.015-Inch Thick and Was Applied in a Single Operation

FOR many years the processing of vinyl resins has been accomplished with the same type of equipment as is used in the rubber industry. Batches have been mixed on rubber mills or in Banburys, and the product has been calendered, molded, or extruded to form it into the desired shapes. Solution coating methods have also been used to a limited extent.

As is well known, rubber processing equipment is heavy and expensive to purchase and operate. There is a definite lack of flexibility in operation of such equipment since any manufacturer will, for example, consider a long time before investing in additional calendering equipment and mills which may well cost him upward of $100,000.

In recent years the creation of a new form of polyvinyl chloride, referred to as a paste forming resin, has made possible the development of simpler, cheaper techniques for forming vinyl products. For those not familiar with vinyl pastes, a short description of the concepts upon which they are based will be applicable.

Basic Concepts

In conventional vinyl processing the resin in powder form is blended with the proper amount of plasticizer and other compounding ingredients by using a device such as a dough mixer. The blend is then fluxed with the plasticizer by heating on a rubber mill. As an alternative, a heated Banbury occasionally takes the place of these two steps. In either case the resin-plasticizer mixture (assuming normal plasticizer content) is at no time in a fluid condition. Before heating, it exists as a dry powder which may be slightly caked, but is certainly not fluid. After heating, the mixture becomes homogeneous and on the mill rolls has an appearance somewhat like that of rubber. It can be shaped only through the application of considerable pressure.

On the other hand a paste forming resin will, when mixed with a normal quantity of liquid plasticizer, assume a fluid or paste quality. The plasticizer is not readily absorbed by the resin and, remaining on the outside of the resin particles, serves as a fluid vehicle for them. To be precise, the resin is dispersed in plasticizer which will later combine with it to serve as its softener. Before heating, the mixture can be shaped with a minimum of pressure; yet, after heating, it assumes exactly the same characteristics as a conventional vinyl.

The product, when in the paste condition, is so fluid that it can be coated on to fabric or other surfaces in exactly the same manner as a solution of resin or of rubber. This important distinction, however, exists: the mixture of paste resin with plasticizer is a 100% solids affair; whereas the resin solution contains a very sizable amount of volatile material which must be disposed of during fusion of the coating. Not only does this operation involve expense and hazard, but it also requires that the resin be deposited in thin layers and fusion carried out at relatively low speeds since blisters will otherwise be formed.

Through use of a vinyl paste of 100% solids content it is possible to prepare coatings 0.020-inch or more thick by means of a single pass through the coating machine. In the fusion operation this deposit can be subjected to high temperatures immediately since nothing is present to expand and form bubbles.

Investigation of this type of paste resin has been under way for quite a few years; the oldest patent disclosure I have seen dated 15 years back. These earlier products, however, fell far short of those presently available and, as a result, never offered the possibilities now obtainable.

As can readily be seen, the viscosity of the resin-plasticizer paste is a function of the amount of plasticizer present. With conventional resins a fluid condition is not obtained unless such a great quantity of plasticizer is used as to lead to an extremely soft and, for practically all purposes, completely useless product. With the earlier forms of paste resin a normal compounding amount of plasticizer provided a paste-like material, but its viscosity was excessive for almost all coating machines, and it became customary to extend the plasticizer with a small quantity of a volatile, non-solvent diluent.

This diluted system was still superior to solution of resin since 70-90% solids contents could be obtained. Furthermore the diluent, being a non-solvent for the resin, could be evaporated more readily than was possible with true solvents. This type of mixture has been named an organosol. When a paste resin is used without addition of diluents, the mixture is referred to as a plastisol.

Recent Developments

In the last few years an English manufacturer, together with my company, has carried this development of paste resin to the point where resin is being produced that, in conventional resin-plasticizer ratio, will give a paste fluid enough to be spread on regular solution coating equipment.

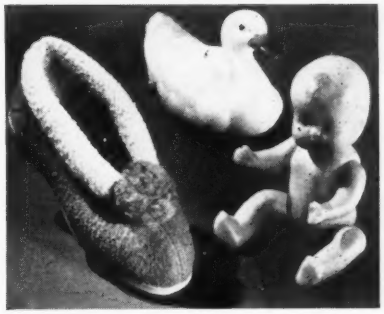


Fig. 2. Toys Slush-Molded with Paste Resin. Slipper Has Sole Cast from Paste Resin

This type of material was described at last year's meeting of the Rubber Division, C.I.C., by Peter A. Delafield, of British Geon, Ltd.[3]

Since the English company had pilot-planted and sold limited quantities of a paste of improved qualities prior to my company's active manufacture of the product, I went to England last year to spend a month in first-hand observation of the uses to which these improvements were being put. A considerable portion of the experience described in this paper was obtained during that trip.

To illustrate better the extent of the improvement effected, some viscosity figures may be given. In a mixture of 66 2/3 parts plasticizer with 100 parts of resin, pastes made with the older forms of resin will have viscosities in the neighborhood of 75,000-100,000 centipoises. These pastes are so stiff as to be completely unwieldy on coating machines unless thinned down in some way. The new paste resins, however, will in the same ratio of 100 parts resin to 66 2/3 parts plasticizer exhibit viscosities of 5,000-10,000 centipoises. This thickness is acceptable for a coating dope, and, in fact, values up to about 20,000 centipoises can usually be tolerated. A vinyl compound of this resin-plasticizer ratio will have a Shore A durometer hardness of 83-85, the normal range for most practical applications.

Dispersion and Formulation

In the development of these improved forms of paste resins close attention has been paid to building in qualities of retention of low viscosity under aging and simplicity in dispersion technique. The new resins, unlike earlier organosol types, can be dispersed in plasticizer by simple stirring. There is no necessity of the use of ball, colloid, or ink mills.

Actually, a great variety of equipment has been used in preparing paste dispersions, and practically all types are acceptable. The choice between them is usually dictated by availability, although it

[1]Presented before the Rubber Division, Chemical Institute of Canada, Montreal, P.Q., Canada, June 9, 1948.

[2]Technical service manager—plastics, B. F. Goodrich Chemical Co., Rose Bldg., Cleveland 15, O.

[3]"Some Recent Developments of the British Plastics Industry," India RUBBER WORLD, 117, 499 (1948).

is true that some types are much more efficient and rapid than others. The most effective type seems to be a positive-action internal mixer such as the Baker-Perkins, or the Beken mixer manufactured in England. This latter machine is excellent and enables the manufacturer to prepare a finished batch of compound of 50-100-gallon size in a matter of 15 minutes. It is quite possible to make the paste dispersion by the use of pony mixers or other simple stirring devices. It is probable, however, that 30-45 minutes will be consumed in the operation.

It is, of course, essential that the temperature be kept down during the dispersing operation, and for this reason a colloid mill is not too satisfactory. Also, owing to the moderately heavy viscosity of the paste, a ball or pebble mill is inconvenient because of excessive retention of paste on the balls. If a stirring device is to be used, it is important that the speed be kept low and that a rather large paddle be used, that is, one that will cause movement of the paste throughout the vessel that contains it. Some operators blend their ingredients in a very simple mixing device and then run the product through a paint or ink mill to smooth it out.

A discussion of mixing methods naturally brings up the question of what should be mixed. Unfortunately this topic is too extensive to fall within the scope of this paper. I would like to point out, however, that choice of plasticizer is important in controlling viscosity of paste and the viscosity aging characteristics of the paste. Also, the plasticizer and other special compounding ingredients are critical in that they have a definite controlling effect on the rheological properties of the paste. Here I refer to the tendency to be thixotropic, that property of a material which makes it viscous under static conditions, but fluid while it is being stirred. Vinyl pastes may also exhibit dilatency, the characteristic property of quicksand, i.e., the ability to flow under continued, slowly applied pressure, but to exhibit great resistance to flow if the stress is applied rapidly. Quite naturally these properties are of great importance in coating work, but they can be adequately controlled by proper compounding.

As in all resin formulating, it is advisable to add heat and light stabilizers and, of course, to incorporate color and to some extent loading pigments into the mixture.

Applications

The greatest use of paste resin today is in the fabric coating field for the production of materials as upholstery. This application is logical because, as has been pointed out, it is possible to lay down the complete deposit of resin material in a single pass through the coating machine. One manufacturer, who produced the samples shown in Figure 1, coats his paste on to the fabric in a single operation, fuses it in a 10-foot heating zone at a speed of about seven yards a minute, and then continuously embosses the product as it leaves the heating zone.

In a calendering operation the vinyl plastic usually leaves the calender at a temperature of about 270-300° F. In the fusion of a paste, however, much higher temperatures, about 350-375° F., are required. Since the plastic coating is at such high temperatures it is quite fluid, and it becomes possible to emboss it by very low pressure contact with a cold engraved roll. At the elevated temperatures mentioned, the vinyl plastic is so fluid that it nearly flows off the fabric; as a result, the pattern is practically cast into the surface of the plastic rather than pushed into it under pressure. Much less expensive embossing equipment is needed, therefore, for the paste coating technique.

It may be asked why a calendered coating of vinyl plastic should not be heated to these 350-375° F. temperatures after leaving the calender in order to utilize this cold roll embossing method. Part of the answer lies in the fact that the heat history acquired by the vinyl plastic is much less in the case of a paste coating than in one imparted by calendering methods. A paste coating undergoes heating for a period of only 20-30 seconds and is probably above 300° F. for only 10 seconds at most. On the other hand, in a calendering operation, particularly if the scheduling is poor, the plastic may be heated to more than 300° F. for as long as a half hour. A calendering batch which has undergone such processing conditions is much less able to withstand a temperature of 375° F. than is a paste formulation with its limited heat history.

Figure 2 shows another interesting example of how these vinyl pastes can be used to lower production costs. These toys were made by Morris & Mitchell Co., London, England, who took advantage of the fact that a vinyl paste is fluid enough to be slush molded. As will be seen in the illustration, the paste can take an excellent reproduction of a complicated surface without any application of pressure. This means that low cost molds can be used since there is practically no strength requirement whatever.

Compared to latex dipping of toys, the paste technique has the advantage of making possible the quick deposition of thick sections. The slipper with the vinyl paste sole shown in Figure 2 is another example of the casting technique. An interesting feature of the manufacturing operation used here is the utilization of a grease gun to transfer some of the paste into its proper position in the mold.

Other proven applications of vinyl paste are seen in the coating of racks both of an industrial nature, such as electroplating racks, and for home products such as dish drainers. One English manufacturer is using paste in the application of insulation to electrical wiring. Where a thin walled coating is desired, it is much easier to get dimensional control by applying a liquid system than by extruding a plastic on to the wire by conventional means.

Summary and Conclusions

I have welcomed this opportunity to discuss vinyl paste technology because I am convinced that the new paste resins will revolutionize much of our present vinyl resin processing. Not only will we have improved and cheaper ways of making our present vinyl plastics, but the breadth of application will increase enormously. Vinyl processors who wish to expand their operations will find that the adoption of some of the techniques mentioned in this paper will enable them to accomplish their purpose with a minimum expenditure of money and time.

Before concluding I would like to correct any impression that may have arisen that these paste techniques are simple enough to be usable by inexperienced or "fly-by-night" operators. It is true that equipment costs will be less when using these pastes. On the other hand, there will be just as many problems and just as much need of quality control and careful raw material selection as there is with conventional vinyl processing. My company will be happy upon request to discuss further the vinyl pastes.

Dow Merchandising Exhibit

IN AN extreme departure from former exhibits, Dow Chemical Co., Midland, Mich., will present the complete story of its Styron merchandising program at the forthcoming National Plastics Exposition to be held in New York, N. Y., September 27 to October 1. The entire booth, measuring 40 feet in length, will be devoted to a display of recently evaluated Styron products, the new Styron label, and reproductions of national advertisements, buyer lists, direct mail, and other media used to back up the company's six-point evaluation program in the interest of upgrading plastic products.

SPI Product Award

THE Plasteen Co., Chicago, Ill., has won the first Junior Achievement Plastics Products Award, sponsored by the Society of the Plastics Industry, Inc., 295 Madison Ave., New York 19, N. Y. Plasteen, sponsored by the Visking Corp., is one of 837 companies organized by Junior Achievement, Inc., a national organization designed to give teen-age boys and girls pre-business experience under the guidance of volunteers from industry. Made up of 14 high school boys and girls, Plasteen produced and marketed 7,890 plastic film babushkas, packaged in varying colored pairs in a clear plastic envelope and sealed with transparent plastic tape. As guests of SPI, two Plasteen officers and one of its adult advisors will receive a trip to New York during the National Plastics Exposition, September 27 to October 1. At this time the SPI will present the company with an award for its headquarters and individual awards for each company member.

Chicago SPE Golf Outing

THE Chicago Section, SPE, held its fifth annual golf outing August 20 at the Elmhurst Country Club, Elmhurst, Ill., attracting approximately 60 members and guests. Arrangements were made by R. T. Lindholm and James Johnston, both of Chicago Molded Products Corp.

In the golf tournament the prize for blind bogey was won by Ray Bauspies, Midwest Molding & Mfg. Co.; while low gross went to Clarence Gault, Hercules Powder Co. Prizes for low net, by the Peoria System, were won by: first, Robert Stephens, Kurz-Kasch, Inc.; second, Mr. Gault; third, Roscoe Amrine, Imperial Molded Products Corp.; fourth, John Stokes, Chicago Molded Products; fifth, R. Brosius, Rohm & Haas Co.; sixth, C. N. Sprankle, Sandee Mfg. Co.; seventh, J. Ferguson, Plaskon Division, Libbey-Owens-Ford Glass Co.; and eighth, Frank Collins, E. I. du Pont de Nemours & Co., Inc.

New Cyanamid Plastics

THE plastics department, American Cyanamid Co., 30 Rockefeller Plaza, New York, N. Y., has introduced two more plastics, a new low-priced Beetle

(*Continued on page 820*)

Scientific and Technical Activities

Rubber Division, A. C. S., Holds Successful Summer Meeting in Los Angeles, Calif.

Chairman Outcault Presenting Goodyear Medal and Certificate of Award to David Spence

THE fifty-third meeting of the Division of Rubber Chemistry of the American Chemical Society, held in Los Angeles, Calif., at the Hotel Mayfair on July 22 and 23, can be considered one of the most successful meetings of the Division. For obvious reasons the registration of 160 members was considerably less than that for meetings held in the East or Midwest, but the interest exhibited in the papers presented and the extended discussions that followed almost every paper amply repaid the authors and the Division officers and committees for their part in the meeting. The morning of July 22 was used for registration, and the technical sessions began at 2:00 p.m. that afternoon and continued during the morning and afternoon of July 23. The banquet of the Division was held the evening of July 22 at the Biltmore Hotel and was preceded by a cocktail party arranged by suppliers to the rubber industry. A business meeting was held the morning of July 23.

Goodyear Medal Award to David Spence

One of the features of the Los Angeles meeting was the award of the Charles Goodyear Medal to David Spence, of Pacific Grove, Calif. Dr. Spence was the first chemist selected in 1941 to deliver the Goodyear Memorial Lecture when this lectureship was established by the Rubber Division. Illness prevented Dr. Spence from delivering the lecture, and also from receiving the medal after the lectureship was replaced by the medal award, until the occasion of the Los Angeles meeting.

Harry E. Outcault, chairman of the Division, presented the Goodyear Medal and certificate of award to Dr. Spence in a brief ceremony the morning of July 23. The Medal, given for outstanding achievement in the chemistry of rubber, was awarded to Dr. Spence for his work on the growth and production of rubber from the guayule shrub. The medalist has a number of publications and patents on rubber chemistry to his credit, and he has conducted extensive research on the nitrogen constituents of raw rubber and its discoloration. In World War I, Dr. Spence was chief of the rubber division of the National Research Council, Washington, D. C., and during World War II was a member of the Guayule Rubber Emergency Project of the United States Department of Agriculture and was also consultant to the War Production Board.

Dr. Spence built and operated the first laboratory devoted entirely to fundamental research on rubber in the United States in 1909 for the Diamond Rubber Co. in Akron, O., which company was later bought by The B. F. Goodrich Co. From 1914 to 1925 he was vice president and general manager of the Norwalk Tire & Rubber Co., of which he was cofounder. For the next six years he was vice president in charge of development of the Intercontinental Rubber Co. Since 1931, Dr. Spence has been in semi-retirement, acting as consultant and doing experimental work on guayule rubber at the Jacques Loeb Laboratory, Stanford University.

In his acceptance, Dr. Spence thanked his colleagues who, he said, had made it possible for him to be selected for the award of the Goodyear Medal. Among those mentioned and to whom Dr. Spence paid tribute was the late Arthur Marks.

25-Year Club Luncheon

A luncheon-meeting of the recently organized 25-Year Club was held July 22 at the Mayfair Hotel. The committee in charge of this affair, J. R. Morath, Naugatuck Chemical Division, United States Rubber Co., and Ed. L. Royal, H. M. Royal, Inc., arranged a very pleasant noon hour which included comments from well-known "old-timers" in the West Coast area on their reactions to the idea of the 25-Year Club and past experiences in the rubber industry. Mr. Morath presided at the luncheon-meeting, at which the attendance totaled 43.

Charles Lamb, West American Rubber Co., gave a very interesting talk on his 50 or more years in the rubber industry under the all-embracing title of "Soles and Heels." Mr. Lamb, a native of Great Britain, came to North America in 1905, following his experience in the rubber industry in his native land and was employed first by the rubber industry in Canada. Within a few years he came to the United States and has been associated with various companies in many parts of the country up to the present time.

The speaker emphasized that he felt that the 50 years he has spent in the rubber industry were very important ones as far as the changes which had taken place in the chemistry and technology, the machinery and the men in the industry. Familiar names in the industry both in England and the United States were discussed, including Thomas Hancock, Alexander Parks, G. B. Dunlop, Henry Wickham and Fordyce Jones, in England, and, in the United States, Harvey Adams, Arthur Marks, and the late Henry Pearson, former editor and publisher of India RUBBER WORLD, whose library is now part of the Los Angeles Public Library.

Mr. Lamb has agreed to prepare his talk for publication in India RUBBER WORLD, and it is hoped that such publication can be accomplished in the near future.

Another member of the Club whose record of 50 or more years in the industry matched that of Mr. Lamb was George Greene, consultant. Mr. Greene also spoke briefly of his experiences over the very considerable number of years he had been associated with the rubber industry.

The Technical Sessions

As mentioned previously, the technical sessions held the afternoon of July 22 and the morning and the afternoon of July 23, were characterized by the unusual amount of interest in the papers presented and the lengthly discussions that followed many of them.

Chairman Outcault in opening the meeting stated that a meeting of the Division of Rubber Chemistry in Los Angeles had been under consideration for some time and that because of the growth of the rubber industry on the West Coast and the urging by certain members of The Los Angeles Rubber Group, Inc., particularly Phil Drew, the executive committee of the Division had agreed to schedule such a meeting. It was mentioned that since C. R. Haynes, Binney & Smith Co., secretary of the Division, was unable to attend the Los Angeles meeting, Phil Drew would substitute for him.

Mr. Outcault then paid tribute to the work of the local committee under D. C. Maddy, Harwick Standard Chemical Co., for its work in arranging for the numerous details in connection with the meeting. Mr. Maddy extended a welcome to the members both from the West and East present at the meeting. R. D. Abbott, C. P. Hall Co., chairman of the suppliers' cocktail party, also invited the members to attend this affair.

Those Present at the 25-Year Club Luncheon at the Division of Rubber Chemistry Meeting in Los Angeles, Calif., July 22 and 23, 1948

Abstracts of the papers were published in our July issue, (pages 536-541), but mention might be made of apparatus for measuring the static electricity produced by masticating rubber on a mill and for following the changes in rubber during compounding, as demonstrated by R. S. Havenhill and others of St. Joseph Lead Co., in connection with his paper on this subject, and the new instrument called the twin transducer which by use of two ordinary radio loudspeakers determines separately the elastic and the viscous properties of rubber, which was discussed by Prof. John D. Ferry and others from the University of Wisconsin. Also, the paper on low-temperature synthetic rubbers by C. E. Fryling and coworkers of Phillips Petroleum Co. was of special interest when it stated that it is the belief of many that the development of low-temperature chemical rubber marks an important milestone in the progress of American industry. The day may not be far distant when more rubber is made in American factories than is produced on the plantations of the rest of the world, it was added.

Papers on Butyl, neoprene, and a new type of "Thiokol" rubber received their share of attention, as did the paper "Reclaimed Rubber Today *versus* Prewar," by A. Fuhrmann and Robert L. Randall, of Midwest Rubber Reclaiming Co.

Transparent new plastic films, thin as paper yet able to keep fruits, vegetables, tobacco, and dry chemicals fresh for more than six months, was the subject of a paper by W. A. Fairclough and others of the Enjay Co. Known as S-polymers, these new films are made from petroleum and owe their preservative properties to their moisture resistance, it was explained.

Another new plastic material, called Tuf-Lite, was described by H. R. Thies, Goodyear Tire & Rubber Co. The raw materials for the new plastic are butadiene-styrene resins, Pliolite S-3 and S-6, plasticized with synthetic or natural rubber, and because of its good tensile strength, high impact resistance, low water adsorption, etc., the new plastic should have a wide scope of industrial uses, it was said. Examples of football helmets, shoulder pads, golf club heads, bowling pins and balls made with this new material and a number of other applications were exhibited.

The Division Banquet

The banquet of the Rubber Division was held at the Biltmore Hotel on the evening of July 22 and attracted about 225 members and guests. Preceded by the cooperative cocktail party sponsored by the suppliers to the industry, which attracted an equal or even larger number of members and guests, and including an excellent program of entertainment in the form of several variety acts, this evening given over to the social aspects of the meeting was a most enjoyable one.

C. H. Churchill, Sterling Rubber Products Co., was chairman of the banquet committee. The chairman of the arrangements committee for the cocktail party was R. D. Abbott, and other members of his committee were B. E. Dougherty, B. E. Dougherty Co.; Mr. Maddy; Montel Montgomery, Martin, Hoyt & Milne, Inc.; Mr. Royal; Victor Schwartz, L. H. Butcher Co.; and Curtis Wolter, Witco Chemical Co.

Chairman Outcault presided at the banquet and introduced those members and guests seated at the head table, which included directors of the Division of Rubber Chemistry, the local committee on arrangements, and directors of the Los Angeles Rubber Group. Seated on Mr. Outcault's right in the following order were: Mr. Churchill; John M. Miller, U. S. Rubber; L. R. Keltner, The B. F. Goodrich Co.; Frank Steele, Goodyear Tire & Rubber Co.; R. L. Short, Kirkhill Rubber Co., director of Tlargi; G. R. Steinbach, Atlas Sponge Rubber Co., director of Tlargi; Mr. Wolter; John T. Blake, Simplex Wire & Cable Co. and a past chairman of Division; E. C. McLaughlin, H. M. Royal, Inc., publicity chairman for the meeting and vice chairman of Tlargi; and Mr. Morath.

On Mr. Outcault's left in order were: Mr. Drew, Goodyear Tire & Rubber Co., Rubber Division director and chairman of Tlargi; R. E. Morris, Mare Island Yard, Rubber Division director; T. K. Hill, Kirkhill Rubber; Mr. Maddy; R. T. Hickcox, Goodyear, chairman of registration and treasury committee for the meeting; R. E. Hutchinson, Firestone Tire & Rubber Co.; George W. Miller, W. J. Voit Rubber Corp., chairman of information and meeting rooms committee; Mr. Abbott; J. C. Ballagh, Patterson-Ballagh, division of Byron Jackson Co. and Tlargi treasurer; and R. E. Bitter, B. F. Goodrich Chemical Co. and chairman of the housing committee.

The Business Meeting

At the business meeting held also on the morning of July 23, Chairman Outcault reminded the members of the fall meeting of the Rubber Division scheduled for Detroit, Mich., at the Book-Cadillac Hotel, November 8, 9, and 10, and the spring meeting to be held in Boston, Mass. The activities of the membership committee have resulted in the addition of 167 regular members and 31 associate members to the Division of Rubber Chemistry, and 39 new A. C. S. members have been obtained, it was reported. The report of the nominating committee was not available, but will be published through the medium of *Chemical and Engineering News* and the rubber trade journals.

Mr. Outcault also reported that a committee had been appointed to define the term "sponsorship" as applied to local rubber groups and that this committee would give its decision at the Detroit meeting.

The new library of the Division with headquarters at the University of Akron was mentioned, and the procedure for the use of its facilities explained to the members. Approval from the headquarters of the A. C. S. has recently been received for the preparation and publication of the book on synthetic elastomers as a part of the A. C. S. monograph series, Mr. Outcault said in conclusion.

November Meeting in Detroit

The fall meeting of the Division of Rubber Chemistry will be held in Detroit, Mich., at the Hotel Book-Cadillac, November 8-10. The morning of Monday, November 8, will be used for registration, and the technical sessions will start in the afternoon of that day at 2:00 p.m. and continue with two sessions on November 9 and 10.

Hotel room reservations may be made by applying to the Hotel Book-Cadillac, convention department, attention George F. Ralston, Jr., and indicating that you are attending the Rubber Division meeting. The number of single rooms available is limited; so it is particularly desirable that men team up in twin bedded rooms. C. W. Selheimer is chairman of the local committee on arrangements, and he and his committee are planning to hold the usual banquet on November 9.

The committee on papers appreciates the excellent response that it has received from the members of the Division of Rubber Chemistry for the two meetings held thus far this year and is looking forward hopefully to an equally instructive and interesting set of papers for this meeting. Abstracts outlining in from 200 to 250 words the subject matter of a paper must be received by the Division secretary, C. R. Haynes, Binney & Smith Co., 41 E. 42nd St., New York 17, N. Y., in triplicate, by September 24, in order to be considered for this meeting.

Mr. Haynes also states in his letter to the members, under date of August 2, that the Division is working closely with the editor of *Industrial and Engineering Chemistry* in order that papers which are not to be printed in the various A. C. S. publications may be released promptly and printed in the the trade journals, as the authors may elect. To insure prompt publication of your paper in any event, three copies should be available for the secretary at the time of the meeting.

Connecticut Group Elects

RESULTS of the recent letter balloting for officers of the Connecticut Rubber Group have been announced. Under the organization's by-laws, Stuart Boyd, United States Rubber Co., the past vice chairman, will become chairman. The other officers elected are: vice chairman, Donald Spengler, Sponge Rubber Products Co.; secretary, Carl Larson, Whitney Blake Co.; treasurer, George Sprague, also of Sponge Rubber; and directors, Hugh Allison, Allison Co., and G. T. Vaala, E. I. du Pont de Nemours & Co., Inc. The new officers will be installed in the Fall.

Buffalo Group Outing

THE Buffalo Rubber Group held a very successful and enjoyable outing on July 31 at the Lancaster Country Club. Members of the Ontario Rubber Section, C.I.C., also joined in the affair, which featured an afternoon of golf and other sports contests, followed by a dinner.

In golf, prizes were awarded to the following: low score, J. W. Ansley, Seiberling Rubber Co. of Canada, Ltd.; high score, H. Knectal, Hewitt-Robins, Inc.; most pars, A. L. Wraight, Dunlop Tire & Rubber Goods Co., Ltd.; most 4's, Roy Tipton, Seiberling-Canada; most 7's, H. J. Denoy, Pierce & Stevens, Canada, Ltd.; and most strokes on one hole, Paul Tufts, Barrett Division, Allied Chemical & Dye Corp.; R. Emmett, Binney & Smith Co.

Mr. Tipton won the nail driving contest; while the pail contest award went to William King, Seiberling-Canada. The team captained by H. Evans, Enjay Co., won the tug of war contest from the team led by E. Bender, U. S. Rubber Reclaiming Co. A. L. Davis, Dunlop, was victorious in the darts contest. The baseball game saw the team led by H. Karch, C. P. Hall Co., win over the team captained by W. Nelson, American Container Corp.

The drawings for door prizes after dinner were won by the following: E. Siverson, Buffalo Weaving & Belting Co.; E. Helmbrecht, Hewitt; G. Ciminelle and R. Schutz, both of U. S. Rubber Reclaiming; Mr. Tufts; J. Hart, and R. Murray, both of Jamestown Finishing Products Co.; and Mr. Tipton.

A. R. Hromatka

Present at the Los Angeles Group Outing Were *(Left to Right)*: R. D. Abbott, C. P. Hall Co. of California; C. J. Wright, General Atlas Carbon Co.; J. M. Miller, United States Rubber Co.; and J. A. Britton, Enjay Co.

Catalina Island Outing

ON JULY 24 and 25, immediately following the meeting of the Division of Rubber Chemistry, A. C. S., in Los Angeles, Calif., members of The Los Angeles Rubber Group, Inc., and their guests, totaling 160 persons, enjoyed the annual outing of the Group at Catalina Island. They left Wilmington, Calif., at 10:00 a.m. on Saturday and arrived at Catalina Island at 12:30 p.m. After getting hotel accommodations somewhat settled, the party had lunch at the Tiny Pipers Restaurant, and then most everyone journeyed to the Catalina Country Club either to participate in the golf tournament or cheer for their respective teams, in which many had a more than passing interest as a result of the Calcutta Auction held on the boat on the way to the Island.

After dinner some members of the party "played the horses"; some sought other forms of diversion, and a few, including those planning on the deep sea fishing trip in the morning, tried to get a good night's rest. The fishing party attracted so many participants that it was necessary to arrange for two boats to accommodate the crowd.

On Sunday morning the program of sports was featured by a baseball game between the suppliers and the manufacturers, which was hotly contested for three innings when it was called on account of a tie score. Del Schade, Ohio Rubber Co., officiated as umpire, and his calling of balls and strikes was phenomenal to say the least. Other events included three-legged, sack, and wheelbarrow races, horseshoe pitching, tennis, football pass and kick, etc.

After a barbecue lunch at the picnic grounds the prizes for the winners of the various events were distributed, and it was so arranged that everyone attending the outing received a prize as a souvenir of the affair.

Prize winners for the golf tournament were: low gross, Al Pickard, Braun Corp.; runner-up low gross, Bill Fairclough, Enjay Co.; high gross, Kal Simon, S & G Rubber Co.; runner-up high gross, Joe Larkin, Patterson Ballagh Division, Byron Jackson Co.; blind bogey, Lloyd Parks, Sharples Chemicals, Inc.; low net, E. C. McLaughlin, H. M. Royal, Inc.; runner-up low net, L. E. Budnick, Ohio Rubber; longest putt, 18th hole, Bob Lees, Amercian Anode, Inc.; high total, blind holes, Walt Delmar, Adamson United Co.; low total putts, A. J. Hawkins, Jr., E. I. du Pont de Nemours & Co., Inc.; runner-up, low total putts, C. T. Erickson, Plastic & Rubber Products Co.; longest drive, Al Fuhrmann, Midwest Rubber Reclaiming Co.; most total traps, Ed Wolson, Golden State Rubber Mills; best tee shot to green, Tway Andrews, H. M. Royal; and runner-up tee shot to green, Dave Parrish, B. F. Goodrich Chemical Co.

The auction of the golf teams which took place on the boat on the way to the Island on Saturday morning was characterized by lively bidding for all of the teams on the board, and the owner of the winning team was well able to pay expenses out of his earnings. The winners were in order: George Steinbach, Atlas Sponge Rubber Co.; M. Friedman, Commercial Rubber Co.; Bill Fairclough; Ed Royal, H. M. Royal; and Jack Britton, Enjay. The grand prize of the outing, a Model 1000 Philco television set, was won by Chas. Lamb, Jr., Lamb Rubber Corp.

The winners of the various events held on Sunday morning are listed below. In some cases the list is unavoidably incomplete because of the difficulty in keeping track of the numerous contests.

In the three-legged race the winners were: R. L. Short, Kirkhill Rubber Co. and M. Hoyle; B. Biheller, H. Muehlstein & Co. and (partner not known); and Dan Budnick, Kirkhill, and Mr. Kyle.

Winners of the sack race were: Al Federico, C. P. Hall Co.; Bob Johnson, Rubber Products, Inc.; and C. H. Churchill, Sterling Rubber Products, Inc.

In tennis the winners were: Burton Smart, Jr., United Carbon Co.; Phil Drew, Goodyear Tire & Rubber Co.; third place winner unknown; and Bill Shawger, California Rubber Products Co.

The wheelbarrow race was won by Bill Michalek, Kirkhill, and Bill Snyder, R. T. Vanderbilt Co.

The horseshoe pitching contest went to Dickson Sheppard, Goodyear. The second and fourth place winners are not known, but the third place winner was Larry Snow, Fullerton Mfg. Co.

Winners in the football passing contest were: Cam Johnston, Caram Mfg. Co.; Mr. Friedman; and Leonard Boller, Technical Coatings, Inc. The football kicking contest was won by Burt Johnson, with Mr. Fairclough, second, and Mr. Andrews, third.

The best fishermen in the first boat follow: Tom Deskin, Western Insulated Wire, Inc.; Bud Borson, H. M. Royal; and John Galitza, S & G Rubber. In the second boat, first prize went to Fred Woerner, Reeves Rubber, Inc.; followed by Glen Goes, Kirkhill, and Dick Zirker, Shell Chemicals, Inc.

The party left Catalina Island by boat at 5:00 p.m. Sunday for home, tired, but satisfied that they had attended one of the most successful outings the Group had ever held.

Much credit for the success of the outing must be given to Mr. Churchill and his committee consisting of Mr. Short, tickets; Mr. McLaughlin, publicity; Carl S. Hoglund, Goodyear, transportation and housing; Mr. Johnston, sports; Mr. Federico, golf; Jack A. Knudson, Kirkhill, fishing trip; C. R. Wolter, raffle prize; and J. R. Morath, Naugatuck Chemical Division, United States Rubber Co., other prizes.

Jet Propulsion Discussed

A TOTAL of 125 members and guests of the Thiokol Technical Club attended a meeting on July 27 at the Thiokol Corp., Trenton, N. J. After a reception and buffet supper, the assemblage heard Col. B. S. Mesick, of the Army Ordnance Rocket Research and Development Division, speak on "Military Applications of Jet Propulsion." He discussed the principles of aerodynamics, operation and construction of the various types of jet propulsion engines now being studied by the Armed Services. The economy and the simplicity of construction and operation as compared with the expensive conventional type of ordnance were emphasized. Colonel Mesick also showed and commented on a captured German color film dealing with the operation of a V-2 rocket firing station in Germany.

Akron Meeting Schedule

MEMBERS of the Akron Rubber Group will hear from an expert in the field of labor relations at their initial meeting of the forthcoming season. The meeting, to be held on October 15 at the Mayflower Hotel, will feature a talk on "The Trend in Labor Relations" by Frank Rising, general manager of Automotive & Aviation Parts Manufacturers, Inc., an association of 400 manufacturers in 30 states.

Other meeting dates for the Group will be February 18, 1949, April 15, and June 17 (summer outing). The panel discussion sponsored by the Group last spring was such an outstanding success that it is planned to repeat it at the February meeting. Tentative plans call for a symposium on industrial fabrics.

Instrumentation Course

THE Texas Agricultural & Mechanical College will offer its third short course on "Instrumentation for the Process Industries" on October 26 to 28. The course will be conducted as a seminar with lectures and discussions on the subject of automatic control. The lectures will cover measurement and control of temperatures, pressure and liquid level, time control, and other allied subjects and will stress the relation between practice and basic control theory. Cooperating with the College in the presentation of this course will be many industrial concerns manufacturing oil, gas, chemical products, process instruments, and automatic controls. Further information may be obtained by writing Professor P. G. Murdoch, Chemical Engineering Department, Texas A & M College, College Station, Tex.

New Hydrocarbon Samples

FIVE new NBS standard hydrocarbon samples have been announced by the National Bureau of Standards, bringing to 144 the number of such compounds now available for calibrating analytical instruments and apparatus in the research, development, and analytical laboratories of the petroleum, rubber, chemical, and allied industries. These samples have been prepared as part of a cooperative program of the Bureau and the American Petroleum Institute, begun in 1943. They follow:

NBS Sample No.*	Compound	Amount of Impurity,† Mole%	Volume per Unit, ML‡
537-58	4-Methyl- trans-2-pentene (4-Vinyld-cyclohexene)	0.08 ±0.07	5
554-58	2, 2, 4, 6, 6 Pentamethylheptane	0.06 ±0.04	5
555-58	1-Undecene	0.09 ±0.08	5
556-58	2, 3-Dihydroindene (Indan)	0.06 ±0.02	5
557-58	4-Ethenyl-1-cyclohexene (4-Vinyld-cyclohexene)	0.10 ±0.07	5

*The designation "58" indicates a sample of five ml. sealed "in vacuum" in a special pyrex glass ampoule with internal "break-off" top.
†Purity evaluated from freezing point measurements, as described in *J. Research NBS*, 35,355 1945), RP1676.
‡Tolerance approximately ±10%.

Instructions for transferring standard samples of hydrocarbons "in vacuum" are available upon request. A complete list of NBS standard sample of hydrocarbons, together with instructions for ordering, may also be obtained from the National Bureau of Standards, Washington 25, D. C.

New Yorkers at Golf Tourney

THE second annual golf tournament of the New York Rubber Group was held on August 24 at the Winged Foot Golf Club, Mamaroneck, N. Y., one of the finest courses in the New York area, and proved a great success with 135 members of the Group and guests playing. The arrangements were in charge of a committee headed by C. R. Haynes, Binney & Smith Co., and including Jean H. Nesbit and T. T. MacConnell, U. S. Rubber Reclaiming Co., E. B. Curtis and A. H. Eufer, R. T. Vanderbilt Co., C. T. Jansen, *The Rubber Age*, and B. B. Wilson, India RUBBER WORLD. The tournament was followed by a dinner attended by 160 players and non-players.

Prize winners were: low gross for members, F. F. Salamon 83, G. W. McComb 87; for guests, V. Lake 79, and H. F. Jones, Jr., 81; high gross for members, M. E. Lerner and C. T. Jansen, each 154.

Prizes were also awarded to H. F. Jones, G. Vasko, and D. Boor, for two birdies each, and to 11 players who got one birdie, also to winners in the putting contest and for coming nearest the pin on the seventh hole. Twenty-four players made the grade in the kickers' handicap.

Thermosetting Coating

CARBO-KOTE, a new type of corrosion resisting, thermosetting resin coating, has been developed by Carboline Co., St. Louis 8, Mo. Although developed primarily for coating wooden surfaces, the material works equally well on rubber, carbon, and Fiberglas. Carbo-Kote is a transparent, brown, somewhat gluey substance when first mixed and applied, but turns green, then black as it sets.

Fluid and catalyst are combined to start polymerization of the material prior to application, which may be done by brushing. The coating should be applied and dried at 70 to 90° F. Coatings 1/64-inch thick will set in one hour to two hours when placed in direct sunlight in warm weather. The finished coating is hard, wear resistant, waterproof, inert, and completely unaffected by immersion in boiling water, it is also claimed. Carbo-Kote resists most acids, alkalis, solvents, and mixtures of these materials, except for sulfuric acid over 45% concentration and nitric acid. The coating is affected by temperatures above 325° F., but decomposes slowly over a period of time. Carbo-Kote films, after setting, will flex about 10-15%. Current applications include coatings for wooden louvres, dens, tanks, laboratory desk tops, fume hoods, and miscellaneous equipment in the chemical, fertilizer, food, pulp, and paper industries.

CALENDAR

Sept. 6-10.	A.C.S. National Meeting, Midwest Session, St. Louis, Mo.
Sept. 13-17.	A.C.S. National Meeting, Western Session, Portland, Oreg.
Sept. 14.	New York Section, SPE. Hotel Sheraton, New York, N. Y.
Sept. 17.	Philadelphia Rubber Group. Annual Outing. Oak Terrace Country Club.
Sept. 17.	Southern Ohio Rubber Group. Engineer's Club of Dayton, Dayton, O.
Sept. 21.	Buffalo Rubber Group. Westbrook Hotel, Buffalo, N. Y.
Sept. 21.	Rochester Section, SPE.
Sept. 24.	Boston Rubber Group. Somerset Hotel, Boston, Mass.
Sept. 27-Oct. 1.	Third National Plastics Exposition. Grand Central Palace, New York, N. Y.
Sept. 30.	Northern California Rubber Group.
Oct. 1.	Detroit Rubber & Plastics Group, Inc. Detroit-Leland Hotel, Detroit, Mich.
Oct. 5.	The Los Angeles Rubber Group, Inc. Hotel Mayfair, Los Angeles, Calif.
Oct. 5-7.	New England Materials Handling Exposition. Mechanics Hall, Boston, Mass.
Oct. 12.	Washington Rubber Group.
Oct. 12-13.	Packaging Machinery Manufacturers Institute. 16th Annual Meeting. Hotel Roosevelt, New York, N. Y.
Oct. 12-14.	National Chemical Exposition and National Industrial Chemical Conference. Coliseum, Chicago, Ill.
Oct. 13.	Newark Section, SPE. Newark Athletic Club, Newark, N. J.
Oct. 13.	Rhode Island & Southeastern Massachusetts Section, SPE. Providence Engineering Society Bldg., Providence, R. I.
Oct. 15.	Akron Rubber Group. Mayflower Hotel, Akron, O.
Oct. 15.	New York Rubber Group. Henry Hudson Hotel, New York, N. Y.
Oct. 18-22.	National Safety Council. 36th National Safety Congress & Exposition. Chicago, Ill.
Oct. 19.	Buffalo Rubber Group. Westbrook Hotel, Buffalo, N. Y.
Oct. 19.	Rochester Section, SPE.
Oct. 20.	South Texas Section, SPE. Ben Milam Hotel, Houston, Tex.
Oct. 28.	Northern California Rubber Group.
Oct. 29.	Cleveland Section, SPE.
Nov. 3-5.	American Society of Body Engineers, Inc. Annual Convention. Rackham Memorial Bldg., Detroit, Mich.
Nov. 8-10.	Division of Rubber Chemistry, A.C.S. Book Cadillac Hotel, Detroit, Mich.
Nov. 9.	Washington Rubber Group.
Nov. 9.	New York Section, SPE.
Nov. 10.	Newark Section, SPE.
Nov. 10.	Rhode Island & Southeastern Massachusetts Section, SPE. Providence Engineering Society Bldg., Providence, R. I.
Nov. 16.	Rochester Section, SPE.
Nov. 18.	Rhode Island Rubber Club. Crown Hotel, Providence, R. I.
Nov. 18.	Northern California Rubber Group.
Nov. 26	Cleveland Section, SPE.

New Plasticizing Oil

SOVALOID A SPECIAL, a new, highly efficient plasticizing oil for many compounds of natural rubber, neoprene, and GR-S, is being marketed by Socony-Vacuum Oil Co., Inc., 26 Broadway, New York 4, N. Y. Amber in color, the new product is said to be more resistant to discoloration than any other general-duty plasticizer now in use in the rubber industry, and to yield tight vulcanizates possessing excellent aging qualities. The new oil has no effect on cure and provides good dispersion of the fillers used in compounding. Tests have shown that comparatively large quantities of the plasticizer can be absorbed by neoprene before the saturation stage is reached or before surface blooming becomes apparent, permitting the manufacture of unusually soft products. The material has a comparatively low viscosity and pours freely at below-zero temperatures.

New Cyanamid Plastics

(*Continued from page 816*)

urea-formaldehyde molding material and a new, highly translucent Melmac 404 melamine-formaldehyde molding compound. The new Beetle material is available in either black or brown, sells for 15½c a pound, and can currently be furnished in limited quantities. Applications for this material include such items as closures, buttons, and wiring devices. Melmac 404 was developed specifically for use in the manufacture of high-gloss buttons and is also currently available in limited quantities.

The company also announced that much greater quantities of urea-formaldehyde molding materials and resins are now available as a result of increased supplies of urea crystal. Cyanamid completed an expansion program at its Wallingford, Conn., plant some time ago which more than doubled the prewar capacity for Beetle molding materials and Urac resin adhesives. Now for the first time it will be possible to utilize these expanded facilities at capacity production.

RUBBER WORLD

NEWS of the MONTH

Highlights—

The consumption of more than three million tons of new rubber since V-J Day, as compared with two million tons during the 1939-41 period, and the continuing demand for rubber products have encouraged the belief by the fabricating industry that a new higher-than-prewar production and sales level may have been established. One medium-sized company, however, has been forced to close down because of high labor costs, and another is unable to get into production after a strike of four months because of a dispute over the union shop. Most companies are following the pattern of the Big Four in granting 11¢-an-hour wage increases and other concessions to union workers.

High Postwar Rubber Consumption Recorded; Higher Than Prewar Production Level Established

In calling attention to the 55% greater consumption of rubber since the end of the late war as compared with the three immediate prewar years, industry leaders have indicated that they feel the chance is good that the present higher-than-prewar rubber goods production rate may be the new average rate for the fabricating industry. A tight supply-demand situation in natural rubber was therefore estimated for the next year or more, despite higher production for 1948 recently suggested by the Department of Commerce.

Pharis Tire & Rubber Co. is definitely considering liquidation of its Newark, O., plant because of inability to settle a wage dispute with the URWA. Sun Rubber Co., Barberton, O., which has been closed by a strike for almost as long as the Pharis plant, seems unable to settle a dispute with the same union regarding the union shop.

Wage increases and other concessions were granted by Mohawk, Pennsylvania, and Midwest Rubber Reclaiming.

Postwar Industry Production Record

Comments on the production record of the rubber goods manufacturing industry during the postwar period and its relation to future operations were made by two industry executives last month.

John L. Collyer, president of The B. F. Goodrich Co., called attention to the estimated consumption of rubber in this country during the last 36 months since V-J Day of 3,135,873 long tons, as compared with the consumption total for the years of 1939, 1940, and 1941 of 2,025,819 long tons. Although in some lines of rubber products the backlog of demand caused by the war was satisfied by late in 1947, the consumption of rubber has remained at a level about equal to the 1945-47 period.

A major factor in this increase in the annual consumption of rubber is the use of more rubber-tired vehicles for freight and passenger transportation and in farming, and the use of more and larger tires on trucks, busses, and farm service vehicles, Mr. Collyer said. About 16,000,000 truck and bus tires have been produced each year since V-J Day, contrasted with 9,000,000 each year during 1939-41.

More than 2,400,000 rubber-tired farm tractors are in use, as compared with less than 900,000 on the average for the years 1939, '40, and '41, and the estimated production of farm service tires is 5,200,000, nearly 3½ times the average annual output for the three-years before the war.

Another factor contributing to the continuing high rubber consumption is the greater mileage being driven by the American motorist during the postwar years. Mr. Collyer cited the result of recent surveys by the Public Roads Administration, which reported that passenger autos are averaging 20% more miles than they were in the prewar years.

Industrial applications of rubber for materials-handling jobs have also increased steadily with the result that manufacturers of conveyer belts are unable to catch up with the demand. The use of rubber to solve many other industrial problems is much greater than prewar, and a much greater tonnage of rubber is being consumed by the mechanical goods branch of the rubber industry, Mr. Collyer added.

In a similar vein, P. W. Litchfield, chairman of the Goodyear Tire & Rubber Co., stated that even after three years of peacetime production during which a tremendous replacement backlog has largely been filled, the demand for all rubber products still continues at high levels compared with the immediate prewar years.

Mr. Litchfield estimated that the replacement demand for passenger-car tires in 1949 would exceed this year's estimated output of 40,500,000 tires and that the replacement demand for truck and bus tires would equal the 1948 production of approximately 7,500,000.

The outlook for total tire production for 1948, even with the expected seasonal decline in the fourth quarter, is for some 86,000,000 tires, against last year's all-time record of 100,000,000 and between 60,000,000 and 63,000,000 in the best prewar years. Current estimates for 1949, according to Mr. Litchfield, place the demand at roughly 81,000,000 tires, barring any serious readjustments of the existing inflationary spiral.

During the past three years approximately 260 million tires for motor vehicles have been produced by the American rubber industry, as compared with 180 million in the three-year period before the war, an increase of 45%.

Mr. Litchfield called attention to the heavy continuing demand in the non-transportation group of rubber products such as mechanical goods, heels and soles, and the new developments such as foamed rubber, rubber films, and covering materials. In this field approximately 30% of all new rubber, both natural and synthetic, is consumed, which means the use of about 300,000 long tons of new rubber a year at the present time.

The high level of demand for tires and other rubber products was attributed to the increased number of cars, trucks, and tractors in operation, to the unsatisfied demand for all types of new motor vehicles, to increased mileages driven yearly, and to sustained high levels of purchasing power and business activity.

Another report on tire industry activity in the New York *Journal of Commerce* for August 24 refers to the belief of "some industry leaders" that a new "normal peacetime basis of sales" is being established at recent levels, which are sharply higher than prewar "normal" sales. It was also pointed out that because of the virility of the replacement market and the greater profit margin on tires sold in this market, the industry as a whole was able to maintain profit margins this year, whereas earlier there had been anticipated a decline in profit margins.

Shipments of tire casings for use on passenger cars, trucks, and buses during June totaled 7,826,685, an increase of 25.1% above the 6,254,415 shipped during May, according to the report issued last month by The Rubber Manufacturers Association, Inc.

Production increased 9.4% to 7,584,305, against 6,930,793 during the previous month; while inventories were at the slightly lower level of 11,435,160, against 11,611,108 reported previously.

Passenger casings showed the larger increases. Shipments of 6,480,927 were 26.8% above the 5,109,644 reported for May, and production was 6,297,996, against May's 5,719,740, or an increase of 10.1%.

Truck and bus casing shipped were 1,345,758 during June, an increase of 17.8% over the 1,144,771 shipped during May, and production was 1,286,309, as compared with 1,211,053 reported for May.

F.O.B. Pricing Decision Criticized

L. A. McQueen, vice president of The General Tire & Rubber Co., while in Washington late in July attending a meeting of the National Distribution Council of the United States Department of Commerce, of which he is chairman, criticized the recent Supreme Court decision which sustains the Federal Trade Commission's demand that the cement industry use the f.o.b. pricing system for its products in the future instead of the basing point system.

The new pricing situation has created a feeling that business is being further "harassed and hampered" by certain government regulations, Mr. McQueen said. He was of the opinion that the changing trend in industrial pricing methods eventually would reach and upset the pricing of the rubber industry.

The result would be higher delivered prices for tires and other rubber products, just as it now works with products of the cement and the steel industries which have changed to f.o.b. pricing. Customers must absorb freight charges under f.o.b. pricing. The rubber industry's system is to absorb freight costs to all points on shipments over 100 pounds.

Mr. McQueen noted that the change would not be forced upon the rubber industry unless a complaint regarding the industry's pricing system was made to the FTC, resulting in an order to change to f.o.b. pricing.

Revised World Rubber Supply-Demand Estimates

Lockwood's *Rubber Report* for August 15 and E. G. Holt in Department of Com-

merce publications during July and August have confirmed the estimate published last month of a world production of between 1,450,000 to 1,500,000 long tons of natural rubber for 1948, as given by Earl W. Glenn, Rubber Division, Office of Domestic Commerce. This new estimate is in contrast to the 1,391,000-ton figure previously made by the Rubber Study Group.

Warren Lockwood states that as a result of a recent six weeks' trip to England, France, and Holland, during the course of which innumerable conferences were held with rubber producers, dealers, manufacturers, and government officials, he formed two main impressions:

1. The supply-demand picture for natural rubber is likely to be tighter than previously figured throughout the balance of 1948 and for most, if not all, of 1949.

2. While the moves of Communism in Europe and the United States in recent weeks have been given wide publicity, the effect of communistic-inspired action in the Far East rubber producing areas, *not in 1948, but in 1949 and thereafter*, could be very serious indeed.

Despite the tight supply-demand picture, it was said that after talking with those whose statistical opinions have been valued for many years in the countries visited, Mr. Lockwood was inclined to agree with the higher world production estimate.

A production of 700,000 long tons in 1948 in Malaya was mentioned by Mr. Lockwood; while Mr. Holt estimated a production of 725,000 tons from this source. Netherlands India production was estimated as 420,000 long tons, compared with the previously recorded figure of 370,000 tons. Increased production from other sources to the extent of 25,000 tons was also considered possible.

The July issue of *Fortune*, however, includes an article, "Report from Indonesia," which points out that business stands still while the natives and the Dutch wage their "shooting truce." The political-economic developments of prewar and postwar years are reviewed, and it is indicated that exports of rubber and other products from this area are not likely to reach their prewar level until stability is achieved and capital can be attracted to the Dutch East Indies.

Another article in this same issue of *Fortune*, entitled "Great Merchant Adventurer," describes the activities of Harrisons & Crosfield of London in the Far East and includes much discussion of the present-day problem of the natural rubber producer. It is stated that a recent study sponsored by the Malayan Government showed that f.o.b. costs for natural rubber varied between 8¢ and 37¢ a pound, with the average at 17¢. The estate *versus* the smallholder problem is mentioned as is the work of P. T. Bauer on this subject, which has been published in India Rubber World.[1]

The production of rubber in Malaya during the first half of 1948 was 347,685 tons, an increase of 11.8% over the output for the first half of 1947, according to Mr. Holt. Gross exports in the first six months of 1948 were 478,800 tons, an increase of 15,140 tons, or 3.3%, over the corresponding 1947 figure. Shipments to the United States were 5,348 tons smaller in the 1948 period, amounting to 42% of total exports.

Shipments to Russia were 24,698 tons during the half year. Average shipments of 9,000 tons a month for the remainder of 1948 will be required to bring the Russian total to the 80,000 tons recently estimated by the *London Financial Times*, according to the Commerce Department. Another source stated that Russian imports of natural rubber in 1948 may be much higher than the 80,000-ton figure. Although this tonnage is not large when compared with imports into the United States, the Russian imports are mostly the best grades of smoked sheet rubber, which is in shortest supply.

[1] Aug., 1947, p. 629; Sept., p. 783.

In commenting on the effect of the present supply-demand situation on the outlook over the months ahead, Lockwood's *Report* recalls that the Rubber Act of 1948 specified minimum required usage of synthetic rubber considerably below present consumption levels. The Act specifically states that mandatory usage shall be no more than is necessary in the interest of national security, and there is no evidence that stockpile purchases in 1948 have not been made according to present schedules. It also seems probable that the government will continue to regard stockpile requirements of natural rubber as a base and the balance available for private purposes.

If the amount of rubber available for private purposes should be inadequate in the fourth quarter of 1948 and should remain short in 1949, and the price of natural rubber should rise as a consequence, a larger voluntary consumption of GR-S and reclaimed rubber rather than an increased mandatory use of GR-S seems more likely, Lockwood's *Report* states.

In June, total new rubber consumption in the United States increased to 95,010 long tons from the 87,290 tons consumed in May, according to the preliminary figures from the ODC, Department of Commerce. Consumption for the initial half of 1948 was 547,778 tons, as compared with about 572,000 tons for a similar period in 1947.

Consumption of natural rubber during June was 55,692 tons,, including 2,278 tons of latex. Synthetic rubber consumption was 39,318 tons, consisting of 30,587 tons of GR-S, 2,726 tons of neoprene, 5,369 tons of Butyl, and 636 tons of nitrile types.

Consumption of GR-S amounted to 35.5% of the total GR-S plus natural in June, a slight increase above the 34.7% of April and May. On a percentage basis the consumption of natural rubber out of total new rubber was somewhat less, and the consumption of all synthetics slightly higher.

Imports of natural rubber for June were 64,055 tons, including 2,288 of latex, as against 40,709 tons, including 1,816 tons of latex, in May. Production of synthetic rubber in June was 41,206 tons, consisting of 35,445 tons of GR-S, 2,670 tons of neoprene, 2,183 tons of Butyl, and 908 tons of nitrile types.

Stocks available to industry at the end of June were: natural, 118,389 tons, including 9,006 tons of latex; GR-S, 71,568 tons; neoprene, 5,753 tons; Butyl, 9,575 tons, and nitrile types, 2,318 tons.

The RMA at the end of August released its preliminary estimate of July rubber consumption. The estimate indicates total rubber consumption in July of 85,135 long tons, against 95,010 long tons in June, a decrease of 10.4%.

July consumption by types was as follows: natural, 50,418; GR-S, 27,232; neoprene, 2,132; Butyl, 4,698; and nitrile types, 655 long tons.

Information of the world's rubber position was presented by the Secretariat of the Rubber Study Group during August. Production of natural rubber for June was given as 135,000 long tons and for the first six months of 1948 as 727,500 tons; while consumption of natural rubber during June was 115,000 tons and for the first half of the year, 667,500 tons. Stocks of natural rubber at the end of June were as follows: in producing areas, 215,000 tons; in consuming areas, 375,000 tons; and afloat, 260,000 tons; and total, 850,000 tons, equal to the stocks at the beginning of the year.

Synthetic rubber production on a world basis is given as 45,000 tons for June and 272,500 tons for the half year. Consumption is given as 42,500 tons for June and 245,000 tons for the January/June period. World stocks of synthetic rubber are given as 102,500 tons at the end of June, an increase since the first of the year of 25,000 tons.

Management Labor Relations

Pharis Tire & Rubber Co. management announced in mid-August that liquidation estimates on its Newark, O., plant are being prepared and will be submitted to the stockholders in the near future. This plant has been closed since May 1 when the company asked the workers to take a wage cut, claiming the rates were too high to permit the firm to compete with other tire companies. At a meeting of the board of directors of the company in New York on July 15 it was decided to continue negotiations with the union for a definite period of time as there were hopes at that time that the plant might be reopened, but apparently these hopes were not realized.

Furber Marshall, president of the company, stated that the shutdown has continued for such a long period that the company is no longer in a position to negotiate a loan with banks even if the differences with the union were to be ironed out now. Under these conditions continued operation of the plant is impossible, and liquidation is the only action left open to the company, he added.

Closing of the Newark plant, Mr. Marshall explained, will result in the discontinuance of the company's automobile passenger-car tire line. Bicycle tire and tube manufacture will be continued at the Carlisle, Pa., plant; while brakes and molded materials will continue to be produced at the Ridgeway, Pa., plant.

The dispute began when Mr. Marshall told the United Rubber Workers union that the firm couldn't continue to pay the existing wage rates. He said his company was losing money and proposed a reduction in incentive rates and a lengthening of the work week from 30 to 40 hours.

Union officials claimed that under this setup employes would work 10 hours more a week and get only a few dollars more. Since this plan would result in a reduction in wages on an hourly basis, the union refused to accept it.

Sun Rubber Strike Continues

Although there was some indication of disagreement by the members of URWA local union 58, at the Sun Rubber Co. plant at Barberton, Ohio, where a strike has been in progress since May 8, with the decision of the union officers and the majority of the local union to continue the strike, this strike seemed unlikely of early settlement.

L. S. Buckmaster, president of the international URWA, issued a statement on August 6 in which he said that the international union is solidly behind the striking workers and is raising money to help the 1,200 workers who had not been at work for over three months at that time. He put the blame for the long strike directly on the company and charged that the company had refused to consider most of the points in dispute before the strike began.

An 11% reduction in the number of

salaried workers at the plant was announced by the company on August 12 because much business had been lost since the strike began. In announcing the cutback, company officials said the strike had cost them much of the year's business, which is mainly the production of articles for the Christmas season.

The union shop, which is the main point of this dispute, will not be granted by the company according to a letter to the employes by T. W. Smith, Jr., president of the company, in mid-August. He said the company is willing to negotiate any point which may settle this strike except the union shop.

"The international union officers have told us that your local union has the authority to settle this strike. The responsibility is therefore in the hands of local 58," Mr. Smith said in his letter.

"Since the company will not grant a union shop, isn't it about time for the union and the company to sit down and find some other method of terminating this strike," it was added.

Other Strikes and Work-Stoppages

The Manhattan Rubber Division, Raybestos-Manhattan, Inc., Passaic, N. J., was shut down one week in August by virtue of a wage increase dispute. The workers finally voted 925 to 669 on August 16 to return to work while a fact-finding panel chosen by the State Mediation Board determines the various factors to support the demand of the union for a 11¢-an-hour increase and the company's offer of a 9¢ increase.

A walkout of 12 tire builders in the Akron, O., plant of the Firestone Tire & Rubber Co., on August 16, hampered the work of 2,500 other employes, but this work-stoppage lasted only 24 hours. The dispute was over new wage rates set for operating new-type machinery.

A four-week strike by workers at the Barberton, O, plant of Midwest Rubber Reclaiming Co. was ended August 9, with the approval by the URWA local 77 union of a new contract granting an 11¢-an-hour wage increase and a three weeks' vacation for employes with 15 years of service. The new agreement runs for two years, but the wage question may be reopened after one year on 60-day notice.

Mohawk and Pennsylvania Grant Raises

Members of local 6, URWA, at the plant of the Mohawk Rubber Co. in Akron accepted an 11¢-an-hour wage increase and a three-week vacation plant of employes with 15 years of service, as offered by the company, early in August.

A similar settlement was also accepted last month by workers at the Pennsylvania Rubber Co. plant in Jeannette, Pa.

URWA Convention

The convention of the URWA union scheduled for Omaha, Neb., September 20-26 is likely to find the reelection of L. S. Buckmaster as president opposed by George R. Bass, president of local 5, at the Goodrich plant in Akron.

In announcing his candidacy, Mr. Bass criticized President Buckmaster for failing to force the large companies to bargain on a Big Four basis. He added that his criticism of the top leadership of the union is shared by the majority of the executive board.

Mr. Bass is expected to be the candidate of the anti-Buckmaster faction led by N. H. Eagle, the union's organizational director, which also includes H. R. Lloyd, general vice president.

Mr. Buckmaster in a reply to the criticism of Mr. Bass said that the union's wage policy this year did not contemplate or propose "industry-wide" bargaining and that Mr. Bass was a member of all union committees which formulated wage policies for the year.

"Certain decisions as the implementation of these policies were left to the discretion of the three top officers of our international union," Mr. Buckmaster said. "So when Mr. Bass criticizes the 'top leadership', he is criticizing not only myself, but also the other two individuals who are in his political camp," it was added.

EAST

Krismann Promoted

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has made Emil H. Krismann manager of the Akron, O., branch office of the rubber chemicals division, to succeed Harry A. Hoffman, who will retire October 31.

Mr. Krismann, born in 1902 in Connellsville, Pa., studied three years at Kenyon College, before obtaining degrees in organic chemistry and chemical engineering at the University of Berlin in 1925. He came to du Pont from The Goodyear Tire & Rubber Co. in February, 1931. After several years in the rubber laboratory, he served in Boston as technical representative of the rubber chemicals division for New England until he became assistant sales manager of the division in 1944, with headquarters in Wilmington. Mr. Krismann is a member of the American Chemical Society and of the executive committee of the Division of Rubber Chemistry. In addition he is advertising manager of *Rubber Chemistry and Technology*.

Mr. Hoffman was born in 1883 in Indianapolis and attended Indiana University. He came to Akron in 1910 to join the technical staff of The B. F. Goodrich Co., where he spent 18 years. In 1930 he joined Roessler & Hasslacher Chemical Co. as technical representative on rubber chemicals and became associated with du Pont when the two concerns were consolidated in 1931. He served as technical representative of the rubber chemicals division for the Ohio area and, since its creation in 1945, as manager of the Akron branch office of the division.

Emil H. Krismann

This branch serves the Ohio, western New York, western Pennsylvania, and southern areas for the sales of rubber chemicals, colors, and neoprene to the rubber industry and of chemicals to the synthetic rubber producing plants. Through its modern rubber laboratory technical service is provided for the entire Midwest as well as for the South. Besides being responsible for the division sales interests and technical service for the areas mentioned, Mr. Krismann will supervise the sale of chemicals and neoprene to the entire tire industry in this country.

Directly in charge of the Akron service laboratory under Mr. Krismann is Charles J. Mighton as laboratory manager. Reporting to Dr. Mighton are E. P. Hartsfield and Embert L. Stangor, chemists, Thurman M. Taylor, supervisor, and several laboratory technicians.

Most of the direct sales activities of the Akron branch, under Mr. Krismann's supervision, will be handled by Ralph B. Appleby and William H. Ayscue.

New du Pont Liner

Du Pont Liner #1, a coated cotton duck, has been developed by the company to prevent adhesion of uncured rubber in storage or during transit. The company does not sell the liner, but simply processes the duck for tire manufacturers at its Newburgh, N. Y., plant. The duck is coated in the desired color with a pyroxylin solution containing special plasticizers that prevent the adhesion of uncured rubber. The treated fabric is then embossed in Doric grain to insure minimum contact of the liner surface with the rubber. Loss by shrinkage of the liner is said to be very small.

C. E. D. Research Projects

The Committee for Economic Development, at a press conference in New York, N. Y., at the Waldorf-Astoria Hotel, announced through W. Walter Williams, C. E. D. chairman, the appointment of Philip D. Reed, chairman of the board of General Electric Co., as chairman of the research and policy committee of the C. E. D. In this capacity Mr. Reed will direct the research activities of this organization, succeeding Raymond Rubicam, whose term has expired.

In commenting on Mr. Reed's election to this chairmanship, Mr. Williams said: "The critical problems today facing America and its free enterprise system call for an intensification of the objective research studies which C. E. D. has been conducting."

In announcing a new program detailing the perplexing areas of our economy to which C. E. D. will devote its immediate research studies, Mr. Reed listed the following: (1) safeguards against extremes of economic instability (fiscal and monetary policy to combat inflation and deflation); (2) how to raise real wages—money wage rates *vs.* real wage rates *vs.* real labor incomes (putting more purchasing power in the pay envelope); (3) federal tax policy for 1949; (4) international economic readjustment; (5) allocations of resources in a defense economy; (6) how to keep our economic and individual freedoms in a Garrison state.

Names G-E Distributer

The appointment of the Graybar Electric Co. as national distributer for the resin and insulation materials division of General Electric Co's. chemical department, Pittsfield, Mass., was announced last month by Donald S. McKenzie, chemical department general sales manager. The Graybar organization will augment the present distribution of G-E insulating materials in more than 100 principal cities in the country. Graybar will handle all G-E insulating materials except friction and rubber tapes. According to Mr. McKenzie, the Graybar company will market such G-E Products as varnished cloth and tapes, insulating varnishes and compounds, paper and fibers, mica, wedges, soldering materials, cords, sleevings, cotton tapes, and varnished tubings.

New Silicone Developments

A new silicone rubber-coated glass cloth which will withstand operating temperatures as high as 520° F., a new adhesive for bonding silicone rubber to itself or to metals and ceramics, and many new applications of molded and extruded silicone rubber were the major developments achieved by the G-E chemical department in the silicone rubber field during the past year. The rubber-glass cloth was developed for gasket use in aircraft engines, but is also attracting considerable attention as an ironing surface by laundries and in tape form as high-temperature cable insulation. The new adhesive has proved especially useful in securing rubber gaskets directly to oven doors, thus eliminating the need of clamps and bolts, and can also be used for joining the ends of extruded silicone rubber stock to form O-rings of uniform thickness.

A new material which reduces water absorption in concrete and cement products and forms an invisible water-repellent coating on walls, floors, and similar surfaces is being investigated by the chemical department. A derivative of the G-E silicone materials, the water-repellent is a new grade of Dri-Film, which has been used successfully for treating ceramics, paper, plastics, and other materials and can be applied by either spraying or brushing.

G-E silicone oil has also found a new use as a mold release agent in the injection molding of aluminum and zinc die castings. Used in emlusion form, the oil facilitates production of certain types of die castings and helps provide a smooth surface on the finished parts. The oil, it is claimed, wets the mold readily, penetrates any small cavity, withstands temperatures up to 600° F., and may be applied by brushing, spraying, or wiping.

Induction Heating Corp., 181 Wythe Ave., Brooklyn 11, N. Y., has announced a new plan whereby the company's Ther-Monic induction and dielectric heating equipment is made available to industry under a rental-purchase arrangement. Under this plan new or used induction and dielectric generators may be rented from the company on a monthly basis with the option to buy at any time. A portion of the rental payments form an equity toward outright purchase. The plan is said to be unique in the heavy equipment field in that it provides proof of the machines' abilities prior to purchase and permits the use of a "pay as you go" arrangement by purchasers.

Kemp Retires

On August 1, Archie Reed Kemp retired from Bell Telephone Laboratories, Inc., where he was in charge of research and development work on rubber, plastics, electrical insulating materials, and organic chemicals. Born near Groton, S. D., on April 24, 1894, Mr. Kemp received his B.S. degree in 1917 and M.S. degree in 1918 from the California Institute of Technology. He joined the Western Electric Engineering Department, now the Bell Telephone Laboratories, in 1918 and completed three decades of service with the Bell System prior to his retirement.

Mr. Kemp devoted 12 years to active research on submarine cable insulation problems and is the inventor of paragutta used for the insulation of submarine telephone cables. He developed the pressure equalizer material used on high-speed permalloy loaded submarine telegraph cables and has been very active in the development of processes for the continuous vulcanization of rubber insulation on wires. The author of some 48 articles and fundamental studies on rubber, insulating materials, and submarine cables, Mr. Kemp also holds more than 40 United States patents on his work.

Kahlen Kazanjian

Archie Reed Kemp

Mr. Kemp was chairman of the Division of Rubber Chemistry, American Chemical Society, in 1938 and of the New York Rubber Group in 1933. In 1938 he acted as special representative of the A. C. S. and the Rubber Division to the International London Rubber Technology Conference, where he presented two papers. Mr. Kemp is also a fellow of the Institution of the Rubber Industry and a member of the American Institute of Chemical Engineers, American Association for the Advancement of Science, New York Academy of Science, American Society for Testing Materials, and other societies. Since the inception of India RUBBER WORLD's Editorial Advisory Board in 1946, Mr. Kemp has acted as an adviser in the fields of wire and cable, hard rubber, and general rubber chemistry and technology.

He is planning to go into business as a consultant on the West Coast, specializing in the fields of latex, vulcanization and aging of rubber, and the use of rubber as an insulating material. His address will be 3404 E. Third St., Long Beach, Calif.

Emery Advances Archiable

Emery Industries, Inc., chemical manufacturer of Cincinnati, O., last month announced several changes in executive personnel.

John M. Archiable has been made works manager. With the company since 1930, when he was graduated from the University of Cincinnati with the degree of chemical engineer, he recently had been plant superintendent.

Succeeding Mr. Archiable in that capacity is Robert Bruch, also a chemical engineering graduate of the University of Cincinnati. Mr. Bruch's assistant will be Milton Shear, associated with Emery for 20 years.

The three men supervise all manufacturing operations at Emery's Ivorydale plant which includes the chemical, Twitchell, and Plastolein divisions.

Robert F. Brown is the new chemical sales manager of Emery Industries. He succeeds C. W. Sampson, now head of the newly formed export department of the company. Mr. Brown handles all Emery domestic sales of fatty acids, fatty acid derivatives, and Twitchell products. His headquarters will be in Emery's home office, 4206-19 Carew Tower, Cincinnati.

Robert A. Behrman has been added to Emery's sales service department. Mr. Behrman, who holds a chemical degree from Iowa State College, recently completed his graduate work in the Harvard School of Business Administration.

Stockholder Report Awards

From the more than 4,000 corporation annual reports submitted from all over the country for consideration in the eighth annual survey, conducted by Weston Smith, of *Financial World*, 80 Trinity Pl., New York 6, N. Y., nine rubber and tire companies have qualified for "Highest Merit Award" citations. These companies are Armstrong Rubber Co., Dayton Rubber Co., General Tire & Rubber Co., B. F. Goodrich Co., Goodyear Tire & Rubber Co., Hewitt-Robins, Inc., Norwalk Tire & Rubber Co., Seiberling Rubber Co., and Thermoid Co.

The 1947 stockholder reports of these companies are candidates for the final judging, and one will be selected as "Best of the Rubber and Tire Companies" and awarded a bronze "Oscar of Industry" trophy at the *Financial World* annual report awards banquet on October 21 in the Hotel Pennsylvania, New York. A year ago the 1946 annual Goodyear report was judged the best in this industrial classification.

Controllers Institute of America, 1 E. 42nd St., New York 17, N. Y., recently announced election of the following officers in its local chapters, called controls: Buffalo, president, Wm. H. Watkins, controller and assistant treasurer, Hewitt-Robins, Inc.; Boston, secretary (reelected), Frederick L. Patton, assistant to the president, Cambridge Rubber Co.; Los Angeles, director, Elmer H. Paradies, control manager, United States Rubber Co.; New Orleans, director, J. M. Stonnell, controller, Copolymer Corp.; New York, director, Arthur Surkamp, treasurer, U. S. Rubber. Wm. J. Vachout, comptroller of The Pharis Tire & Rubber Co., Newark, O., recently was elected a member of the CIA.

Officers of Holland W. Smith, Inc.: ***(Left to Right)*** **Thomas N. Loser, Holland W. Smith, Jr., Miss Eloise Dabbs, and Holland W. Smith**

Holland W. Smith, Inc., Empire State Bldg., New York, N. Y., recently was established as a national sales organization specializing in pigments, chemicals, and resins. President of the company is Holland W. Smith, formerly vice president and sales manager of Thompson-Weinman Co., New York, and he will have as his associates vice president Holland W. Smith, Jr., who recently resigned as vice president and director of Webber & Smith, Inc.; Vice President Thomas N. Loser formerly assistant sales manager of Thompson-Weinman; and Secretary-Treasurer Eloise Dabbs, previously associated with the company as sales office manager. The new company will specialize in sales and technical service to manufacturers of protective and decorative coatings, rubber, plastics, floor coverings, and allied industries.

The Scientists' & Engineers' Association, Inc., Rock Rimmon Rd., Stamford, Conn., was recently organized as a non-profit corporation to encourage the most efficient use of scientific and engineering knowledge and experience. Pointing out that many scientists and engineers are working in positions which utilize only part of their potential capabilities, the Association has organized a service which specializes in placing such men in more suitable positions. The Association limits itself to individuals in the following classifications: chemists; chemical engineers; electrical, electronic, and radio engineers; physicists; mathematicians; metallurgists; mineralogists; ceramics and glass technologists; bacteriologists; mechanical engineers, including aeronautical, automotive, heating, etc.; and industrial and management engineers. A. D. Halliwell is executive secretary of the Association, whose services are open to all scientists and engineers in the above fields throughout the United States and to employers everywhere.

Dayton Chemical Products Laboratories, following its recent move to new quarters at West Alexandria, O., has expanded manufacturing and storage facilities considerably and has added a new chemical laboratory to supplement the rubber adhesives laboratory heretofore maintained by the company, which specializes in rubber adhesives, liquid rubber products, and rubber compositions in general.

Davidson Promoted

Jack Hamilton, assistant to the president and sales manager of Binney & Smith Co., manufacturer, exporter, and importer of blacks, clays, colors, chemicals, and talc, 41 E. 42nd St., New York 17, N. Y., has announced the appointment of Clement Olmsted Davidson as assistant sales manager of the carbon black division. Mr. Davidson joined Binney & Smith in 1936, as a salesman calling on accounts along the Eastern Seaboard and part of the South. Then he was on active duty in the Navy from May, 1941, until November 1945, serving in the Atlantic Theater and for three years in the Pacific, with the rank of commander. Upon his return to civilian life he rejoined Binney & Smith with an enlarged territory to cover.

Mr. Davidson was born on February 12, 1910. He was graduated from the Sheffield Scientific School of Yale University with a B.S. degree in 1933. He then worked for Standard Oil Co. of New Jersey until 1936.

Affiliated Photo—Conway

Clement Olmsted Davidson

Celebrates Golden Jubilee

Fifty years ago the name "Pennsylvania" was synonymous with rubber jar rings, solid rubber buggy and carriage tires, and rubber floor tile.

Originally founded in Erie, Pa., by Herbert DuPuy at the close of the Nineteenth Century, Pennsylvania Rubber Co. was moved to its present site at Penn-Craft Park, Jeannette, Pa., in 1901.

By 1910 the firm abandoned solid rubber tires for pneumatic automobile and motorcycle tires and tubes. Following the advent of the pneumatic tire, Pennsylvania introduced its Vacuum Cup tire, which featured the popular non-skid tread. The old Vacuum Cup has a worthy successor in today's Silent Vacuum Cup tire, which retains all the non-skid advantages of the original product, from which all objectionable noises have been eliminated.

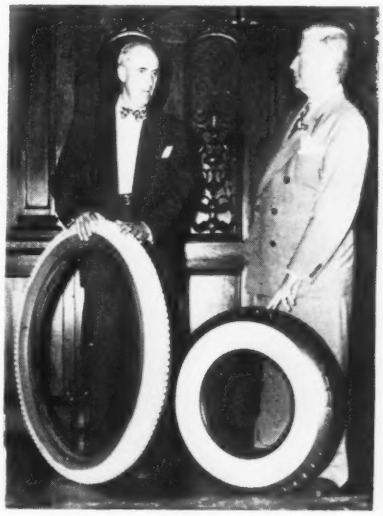
In 1910, rubber jar rings fell by the wayside as tennis balls bounced into production. Today Pennsylvania Rubber is one of the world's largest producers of tennis balls.

The company does not manufacture any of the products it originally made. Complete lines of automobile, truck, tractor, and bicycle tires are manufactured as Pennsylvania commemorates its fiftieth year. The Pennsylvania athletic goods line has been expanded throughout the years to include footballs, softballs, basketballs, volley, soccer, and tennis balls. Toy balls designed for children are also on the company's production list as well as balloons, badminton shuttlecocks, and golf balls.

H. W. Jordan, company president, has guided Pennsylvania for the past seven years.

Pennsylvania, through H. H. Rice, athletic sales manager, also announced a complete new line of Keystone athletic balls. Designed for outdoor play, the balls are quality products of long wearing, official performance, according to Mr. Rice, who said that the new line is aimed at over-the-counter retail selling. Introduced as a companion line to the company's Championship line, the Keystone series includes basketballs, official and intermediate sized footballs, volley balls, soccer balls, and softballs.

The National Automobile Dealers Association, Columbus, will have its members distribute a comic book designed to save lives as a unique approach to the traffic safety problem. According to Ben T. Wright, president of the Association, the 16-page book, entitled "It's Fun to Stay Alive," will be composed of special drawings contributed by some of America's outstanding newspaper comic strip artists. Automobile dealers are expected to give away several million copies of the book to children and adults. Comics have become a most powerful and universal medium, Mr. Wright said, and the use of a comic book is a psychologically sound technique for traffic safety education. Every effort was made in producing the book to break away from conventional traffic safety literature. Because the characters represented in the comic book are familiar to Americans of all ages, readers are expected to accept more willingly the traffic safety lessons which have been worked into the continuity of its pages.



Left to right: **R. B. Cave, vice president in charge of sales at Pennsylvania Rubber, who is holding a Vacuum Cup tire (1905), tells the history of the tire to Governor James H. Duff of Pennsylvania, who holds the current Silent Vacuum Cup tire.**

Power Show

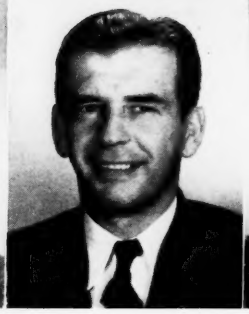
The Eighteenth National Exposition of Power & Mechanical Engineering will be held in Grand Central Palace, New York, N. Y., on November 29 to December 4. Occupying four floors in the Palace, the show will reveal many ways to help check the inflation spiral at one of its numerous sources as exhibitors emphasize equipment designed for new economies in the production, transmission, and regulation of power. Power demand is on the upgrade, with plant expansions accounting for a backlog of equipment orders running several years ahead. The current need in the power field is for means of stepping up existing plants and for cutting power costs wherever leaks can be plugged or higher efficiencies introduced. Devotion to these immediate needs will constitute the theme of this year's power exposition.

Celebrates 20th Anniversary

Last month marked the twentieth milestone in the history of A. Schulman, Inc. Akron, O. In August, 1928, Alex Schulman, president of this scrap rubber and plastics organization, opened a single office and warehouse in Akron. Today the activities of this concern literally cover the globe. A. Schulman, Inc., maintains business facilities in Akron, East St. Louis, Boston, Long Beach, New York, and Jersey City—plus complete facilities for daily operation of a huge export-import business.

In commemoration of this twentieth anniversary, the company has issued a beautiful "Pictorial Tour through the Schulman Plants, Offices and Warehouses." This year book, with its 70 illustrations and more than 50 pages of text, covers the entire Schulman history. Living up to its title: "20 Years of Service to the Rubber and Plastics Industry," this book takes the reader through the complete Schulman service, describing each of the many and varied Schulman activities, covering in detail each of the Schulman divisions and operations.

Ray L. Lasser



Frank Sancic

J. R. Moore

New Officers for Harwick Co.

At a meeting of the board of directors of the Harwick Standard Chemical Co. held at the company's general offices in Akron, O., August 6, J. R. Moore was elected president to fill the vacancy created by the recent death of Curtis J. Harwick.

Mr. Moore had formerly been vice president and was associated with Harwick since 1940 when he started as sales manager. He is well known throughout the chemical trade and is a member of the American Chemical Society and a former chairman of the Akron Rubber Group. He received his degree in chemistry from Miami University. He started with The B. F. Goodrich Co. in 1927, studying compound development and control in the technical training plan inaugurated by Dr. Webster Jones of the general chemical laboratories.

Mrs. Virginia Harwick, widow of the former president, was elected into the directorate as chairman of the board and will participate actively in the direction of the company, serving also as treasurer. Other officers elected were: Ray L. Lasser and L. M. Buckingham, vice presidents; and Frank Sancic, secretary.

"Operating policies," says Mr. Moore, "will remain the same as formulated and adopted by Mr. Harwick during his lifetime, and the business of the company will continue with the same personnel in the Akron offices as well as in its Boston, Trenton, Chicago, and Los Angeles branches."

Erecting Belting Plant

A multi-million dollar plant for the manufacture of industrial rubber belting will be built in Akron by The B. F. Goodrich Co., Vice President T. G. Graham announced last month. Representing the first major expansion of production facilities in Akron by Goodrich in many years, the new plant will be erected only a few feet from the site of the original factory built by Dr. B. F. Goodrich in 1870. Four factory buildings will be razed to permit construction of the new plant.

The new industrial products plant will contain 150,000 square feet of floor space and will house equipment especially designed for the manufacture of various types of belting. Work was started in August.

In the new plant processing of raw materials, stock storage, building, and vulcanizing as well as all plant handling equipment will enable the company to handle any belt requirements including 72-inch belting and any weight or length of finished belting roll that can be shipped on a drop-center flat car.

New belting constructions have already been developed and field proven to meet any present or future conveying need for belting users for any working stress from one pound to 3,000 pounds per inch of belt width. The new plant anticipates any present or future field requirements.

John M. Failey has been made manager of the industrial products division of the Goodrich company in the New York area. Mr. Failey, who has held a number of Goodrich sales and production posts, succeeds Wm. A. Whitenack, who retires September 1.

Aerial View of Present Plant of A. Schulman, Inc., Akron, O., with Original Building (1928) in Inset, Lower Left

Revertex Corp., of America has announced that as of September 1 it merged with its wholly owned subsidiary, Rubber Corp of America. Activities in the future will be continued under the name of Rubber Corp. of America, Latex Division. General offices will, as heretofore, be at 274 Ten Eyck St., Brooklyn 6, N. Y.; while manufacturing operations will be conducted at the plant at Hicksville, L. I., N. Y. The manufacture of vinyl film and sheeting under the trade name "Rucoam," so far carried out by Rubber Corp. of America at its Brooklyn plant will be continued there under the name of Rubber Corp. of America, Rucoam Division.

EXTRUDING SPEED INCREASED 5% TO 7%

Sun Rubber-Processing Aid Decreases "Rugosity" and Increases Extruding Speed

A manufacturer of rubber hose, belts and other such products found that a Sun Rubber-Processing Aid speeded extrusion 5 to 7 percent, besides reducing "rugosity." So superior was it to competitive brands that he standardized on it for his plant.

Here is a typical example of what Sun Rubber-Processing Aids can do to improve quality and increase production. In the manufacture of tires, sheeting, pressure-sensitive tapes, footwear, or any of the myriad other things made of rubber, you will find Sun processing aids doing an important service.

Sun Rubber-Processing Aids speed up milling and calendering; prevent bleeding and migrating; reduce flex-cracking, heat build-up, and hardening. And in some cases they even increase the resilience of the finished vulcanizate.

Sun Rubber-Processing Aids are refined to insure maximum compatibility with the particular type of rubber used. Whether yours is natural, reclaim, or a synthetic, there is a "Job Proved" Sun Rubber-Processing Aid to meet your requirements. For more information, call your nearest Sun Office.

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The Timken Roller Bearing Co., Canton, recently elected Whitley B. Moore vice president in charge of sales; he succeeds L. M. Klinedinst, who retired August 1 after 43 years of service. When Mr. Moore first came to Timken he was assigned to factory equipment engineering; later was transferred to the Pacific Coast in charge of sales and engineering; next was moved to Canton as assistant general manager of the industrial bearings division and later became manager of the division. About three years ago he was made director of all sales.

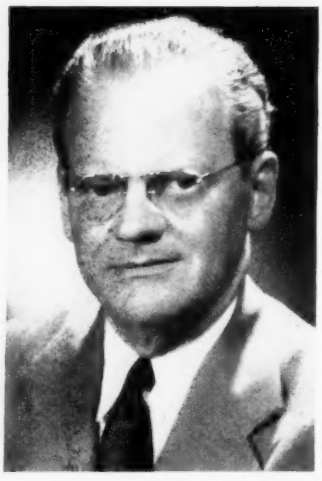
Mr. Klinedinst joined the company in 1905, and it was largely through his guidance that the company branched from the wagon and automotive field into the farm implement and industrial business, which in the last 25 years has been chiefly responsible for the growth and expansion of the Timken bearing business.

Xylos Rubber Co., Akron, O., has expanded activities to include distribution of natural and synthetic latices and compounded adhesives. A new unit of the company has been established, according to C. R. Shaffer, president, which will provide sales service and technical assistance on latices and latex compounds, butyl rubber and reclaim rubber dispersions and cements formerly distributed by Firestone Industrial Products Co. W. F. Jordan, in charge of latex and adhesive sales for the latter company, will head the new division as sales manager. He will be assisted by his present staff which includes J. P. Seguin, W. W. Madden, J. E. Beyer, and C. E. Cain.

Koppers Co., Inc., Pittsburgh 19, Pa., has set up a chemical section in its engineering and construction division to supervise and coordinate engineering and construction work on contracts secured for the erection of plants to produce oxygen, synthetic fuels, and certain types of chemicals. Heading the new section will be T. M. Osborne, project manager on Koppers' contract to build a synthetic liquid fuels plant for the government at Louisiana, Mo.

Godfrey L. Cabot, Inc., 77 Franklin St., Boston 10, Mass., is distributing an unusual advertising piece demonstrating its new system of product identification. An exact reproduction in miniature of a standard sewed carbon black bag has been filled with Cabot advertising matches. Each package is printed in aluminum ink on face and bottom, clearly showing the brand name and customer's code numbers. The little bags graphically portray the type of printing that the company's new bag printing presses are able to do as an aid to customers' convenient identification of materials. The miniature bag is being distributed to customers throughout the company's nationwide sale and agency force.

Hewitt-Robins, Inc., Buffalo, N. Y., will double its production of latex foam rubber beginning September 15 to meet the rapidly expanding market, particularly in the auto industry, for the new cushioning material. Thomas Robins Jr., president, said that an $850,000 expansion to the company's Restfoam division plant at Buffalo had provided the added capacity for the new production program.



Ferd Bonstedt

Opens Akron Office

Frank Andrews, sales manager of the Sid Richardson Carbon Co., Fort Worth, Tex., announced August 1 the employment of Ferd Bonstedt as Akron division manager. Mr. Bonstedt is well known in both the rubber and the carbon black industries, having spent 25 years in these fields. For the past 15 years he was with Binney & Smith Co., the last five of which as carbon black sales manager.

Mr. Bonstedt is opening the Akron office, which will be the focal point for all of the carbon black operations of the Sid Richardson Carbon Co. This office will also eventually handle the sale of the Sid Richardson Gasoline Co.'s solvents to the rubber, extraction, and paint industries in the Ohio, Michigan, and western Pennsylvania areas. The office is located in the Evans Savings & Loan Bldg., 335 S. Main St., Akron, O.

General Tire Expanding Scope

The General Tire & Rubber Co., Akron, has extended its activity in the field of jet propulsion for aircraft with the acquisition of controlling interest in Marquardt Aircraft Co., ramjet engine builder, Venice, Calif.

General, through its president, William O'Neil, has long been interested in the airplane industry. Early in World War II, General was asked by the government to manage the Aerojet Engineering Corp., producer of jet-assisted-takeoff (JATO) units for aircraft, and in 1945 the rubber company acquired controlling interest in this firm.

Marquardt Aircraft is engaged in the research, development, and production of jet propulsion engines. The company was incorporated in 1944, headed by Roy E. Marquardt, who still serves as its president and chief engineer. General Manager is William H. Thomas, who also is the corporation treasurer.

Marquardt employs approximately 150 persons and incorporates an industrial sound control facility, the Kittell muffler division. Expansion plans will be announced later, stated Dan Kimball, vice president in charge of General's California operations.

Purchase was completed with the conveyance of title to its 68-acre rocket plant facilities at Azusa, Calif., largest rocket plant in the United States by Aerojet Engineering from the War Assets Administration, it was announced by T. E. Beehan, secretary-treasurer of the Aerojet division. The plant site, since its construction in 1943, has been under lease by Aerojet from the government. The company was formed in 1942 under the guidance of Theodore von Karman, world famous aerodynamicist, and shortly thereafter entered into production of the standard JATO—jet assisted take-off—rocket motor.

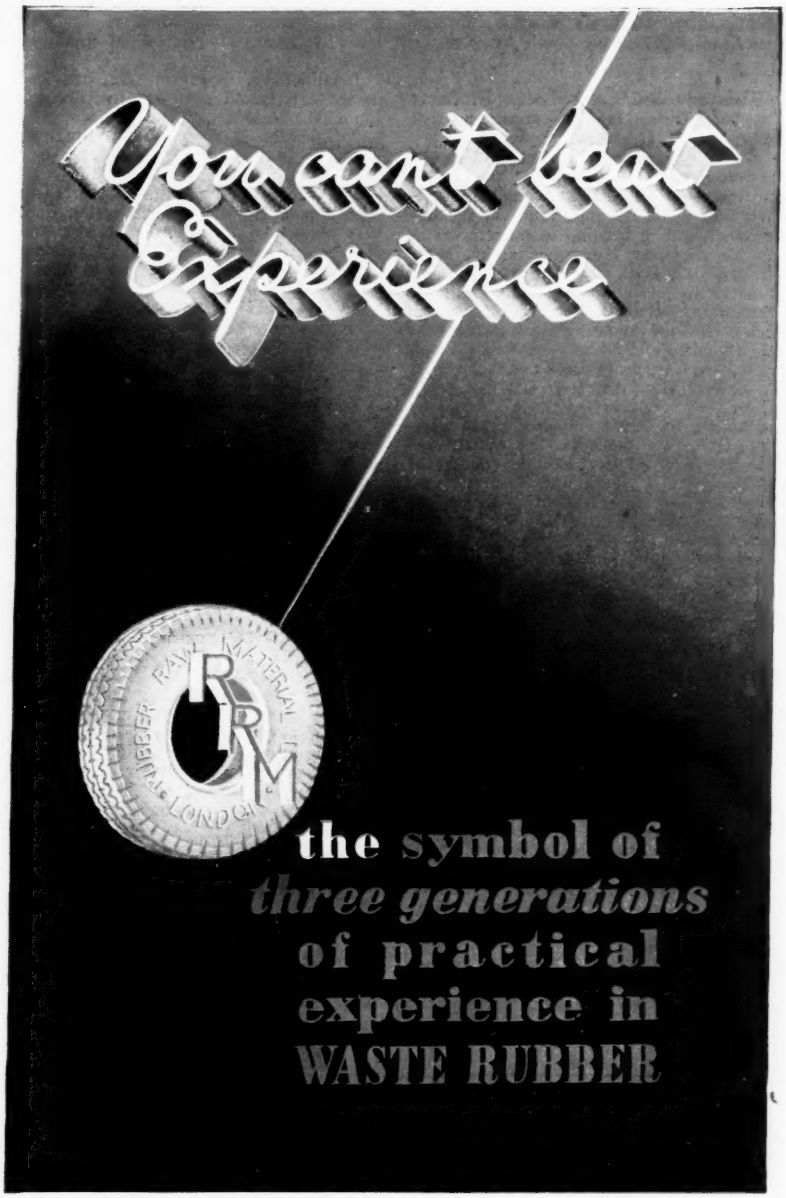
Aerojet reached a production rate during the war of 10,000 JATO rocket motors a month and is in a position at present to produce 20,000 a month. This unit is the first rocket engine to be certificated by the Civil Aeronautics Administration for use on commercial aircraft.

Aerojet is engaged in research and development of liquid propellant and solid propellant rocket power plants and boosters. This work, details of which are restricted for reasons of security, constitutes a major portion of the activity at the Azusa plant site.

The more than 30 million motorists in the United States who will drive during late August and throughout September will read signs saying "Give The Kids A Brake" in almost every direction they drive. Cooperating with the National Safety Council in its back-to-school campaign, General Tire and its distributers across the nation will use this plea in an extensive advertising program. Approximately 100,000 smaller window display posters will carry the same slogan and will be distributed nationally. In addition, a General traffic safety film, "Where Safety Starts," will be shown at hundreds of school, civic organization, and parent-teacher meetings. Ned H. Dearborn, NSC president, lauded General Tire and its distributers for this campaign in a letter to Mr. O'Neil.

General Latex & Chemical Corp., 660 Main St., Cambridge 39, Mass., has added to its development staff Robert E. Thomas as an expert in the development of latex dipping compounds. He had formerly been chief chemist of the Midwest Rubber Co. and also had been employed by Miller Rubber Co. and International Latex Corp. He has been associated with the research and development of latex compounds for nearly 20 years.

American Can Co., New York, N. Y., has revealed that 78% of the natural rubber formerly used in tin can manufacture has been replaced by GR-S and Butyl. Rubber is used in the form of "sealing compounds" which are folded invisibly between layers of compressed metal around the top and the bottom rims of all airtight cans. J. A. Stewart, vice president in charge of research for the can company, said that although natural rubber was used exclusively before the war, GR-S and Butyl have proved so much better for most containers that natural rubber is now being used for only a few specialized types of sealing compounds. Large-scale use of synthetics by the can manufacturing industry not only provides higher-quality cans, but also helps maintain the strategic synthetic rubber industry, Mr. Stewart added. The switch to synthetics began about two years before Pearl Harbor, and these experiments permitted a gradual wartime shift to synthetics which has become permanent.



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B. F. Goodrich Chemical Co., 324 Rose Bldg., Cleveland 15, O., last month announced the following appointments.

H. F. Miller has been named production manager of plants, with headquarters in Cleveland. Plant manager of Plant 3 in Akron since 1942, Mr. Miller has been with The B. F. Goodrich Co. since 1926.

H. B. Warner has been made plant manager of Avon Lake Experimental station. He joined the company in 1939 as a chemist at the main plant in Akron, was transferred in 1940 to the Niagara Falls Geon plant, where he was made plant manager in 1942, and since May, 1948, has been in Cleveland as assistant to W. I. Burt, vice president-manufacturing.

F. C. Hands, production manager of Plant 3 since 1943, replaces Mr. Miller as plant manager. Mr. Hands came to Goodrich in 1935.

Hercules Powder Co., Wilmington, Del., has announced that a new traffic paint based on two of the company's products, Pentalyn 802A, a rosin derivative, and Parlon, chlorinated rubber, has proved outstanding in both rapid drying and durability. Test cross-lines laid down on a highway intersection in South Camden, N. J., considered the second busiest highway intersection in the state, show little signs of wear after more than two months of service. Similar cross-lines of a specified formulation in current use by the state, laid down at the same time alongside the new paint lines, were almost worn away at the end of the two months. The test lines were applied to both concrete and asphalt surfaces. The speed of drying and durability of the Pentalyn-Parlon based paint are outstanding in meeting the prime requisites of traffic paint. The drying time of the new paints vary from 11-20 minutes, depending on thickness of film and type of solvent. When applied with conventional traffic marking equipment on asphalt surfaces, the new paints do not cause bleeding.

United States Rubber Co., Rockefeller Center, New York 20, N. Y., has named Graybar Electric Co. exclusive distributer for Uskon conductive rubber panels used in the radiant heating of homes by electricity.

A. N. Guy has been appointed manager, allied products department of the U. S. tire division, to succeed C. E. Marshall, granted leave of absence to serve with the Economic Cooperation Administration.

Goodyear Tire & Rubber Co., Akron, O., has made Charles G. Crites, manager of the technical service division of Goodyear's plant in Buitenzorg, Java. Mr. Crites joined Goodyear in Akron in 1946, and his latest position was a senior tire designer at the local plant.

New managers have been named for plants of the Goodyear Synthetic Rubber Corp., at Houston, Tex., and Torrance, Calif. Paul S. Shoaff, formerly manager of operations at Torrance, but who has been acting in like capacity at Houston, returns to Torrance. He is succeeded at the Texas operations by William E. Forster, former superintendent of the Goodyear Tire & Rubber Co. operations in Venezuela. Mr. Forster has been at Houston working with Mr. Shoaff for several months.

Mr. Shoaff joined the Goodyear organization in 1922, and Mr. Forster in 1935. The former was on several occasions assigned to plantations work in the Far and Middle East; while Mr. Forster's foreign experience has been in South America.

Firestone Rubber & Latex Products Co., Fall River, Mass., is erecting a brick and steel storage unit.

The new Firestone "form-fitted" Foamex mattress, said to be the first major advancement in foamed latex mattress construction, made its appearance in the exhibits of leading bedding manufacturers at the Mid-Summer Home Furnishing Market in Chicago, Ill. Improvements in basic construction design enable the new mattress to support the heavier parts of the body with the same relative comfort as it cushions the lighter parts. This result is achieved by providing greater firmness in the central section and the outer edges. These structural changes were effected by narrowing the cores or pinholes in various parts of the mattress. The central section and outer edges are thus composed of relatively thick walls of Foamex. The hammock-like depression caused by the weight of the body on a uniformly constructed mattress is thereby eliminated. The new mattress is available in both double- and twin-bed sizes.

WEST

The Dow Chemical Co., Midland, Mich., has advanced E. D. Serdynsky, chemist of the saran development laboratory, to the position of project leader of the laboratory. Mr. Serdynsky took his B.A. degree in applied science from Michigan State College and has been with Dow since 1938.

Recently employed by Dow is I. J. Cummings, Jr., as a chemical engineer in coatings technical service. Mr. Cummings, a graduate in chemistry from Purdue University, was formerly with the Imperial Chemical Co.

Changes at Monsanto

Appointment of James B. Irwin, Jr., as assistant to the president of Monsanto Chemical Co., St. Louis, Mo., was announced August 14 by William M. Rand, president. Mr. Irwin, supervisor of the chlorine department at the company's Monsanto, Ill. plant, succeeds R. U. Haslanger, named assistant to the general manager of the western division, at Seattle, Wash. Mr. Irwin joined Monsanto in September, 1940.

Donald B. McCammond has been named assistant to the director of industrial and public relations at Monsanto. In his new assignment he will supervise eastern operations of the department and will have direct charge of activities of the company's public relations offices in Boston and Springfield, Mass., and in New York.

James G. Zack, divisional director of public relations for the plastics division at Springfield, Mass., has been transferred to St. Louis headquarters of the company. Mr. Zack will supervise industrial relations publications for the department.

J. M. Graham, Jr., has been made assistant director of the general engineering department. Mr. Graham, who has been serving as manager of the department's process section will continue to direct the latter section. He joined Monsanto in 1934.

Jonathan H. Sprague, Jr., has been named a technical representative of Monsanto in Washington, D. C., where he will join the staff of Philip Singleton, assistant to the president, in charge of the company's Washington bureau.

The transfer of William R. Roberts from Springfield, Mass., to Los Angeles, Calif., was announced August 25 by Monsanto. He becomes branch manager in charge of plastics. A veteran of World War I, Mr. Roberts has served with the Monsanto plastics division since 1925.

PACIFIC COAST

W. J. Voit Rubber Corp., 1600 E. 25th St., Los Angeles, Calif., is marketing the new Voit RU1 latex repair unit for the rapid sealing of minor punctures in rubber-covered athletic balls. The unit consists of a tube of highest quality liquid latex, with directions for use, and a standard inflating needle through which the latex is injected into the ball. The unit is not recommended for repair of balls having separate or replaceable bladders, or for larger playground balls.

Ideal Rubber Co. has moved from Los Angeles to 2334 N. Sparks St., Burbank, Calif. E. L. Stair is owner and manager of the firm, which makes Ideal ear stopples for divers and swimmers.

H. O. Keefer has joined Union Rubber Co., 808 E. 62nd St., Los Angeles, Calif.

Witco Chemical Co., 295 Madison Ave., New York 17, N. Y., has moved its Los Angeles, Calif., office from 2465 Porter St. to 649 S. Olive St., in the recently constructed Trans-America Bldg., Rooms 911 and 912.

C. D. Stillman and **H. W. Sears,** formerly with Plastic & Rubber Products Co., have formed the Stillman Rubber Co., 12224 S. Budlong Ave., Los Angeles, Calif.

R. D. Abbott, vice president and general manager of the C. P. Hall Co. of California, has resigned as of September 1 and gone into business for himself as a technical consultant and manufacturer's representative, with offices at 641 S. Atlantic Blvd., Los Angeles 22, Calif. He will specialize in the development of products and their sale to the rubber and allied industries and at present is acting for Marine Magnesium Products Corp., Los Angeles Chemical Co., and other manufacturers of chemicals for these industries. Mr. Abbott was graduated from Cornell University in 1917 and after a period of service with the Naval Air Force in World War I was associated with the Miller Rubber Co., where he was manager of tire development, when he resigned in 1930. He has been with the Hall company since 1932.

TALES WORTH RETELLING

(No. 8 of a series)

SHORTLY AFTER the entry of the United States into the World War, General John J. Pershing was equally criticized and praised by those who thought they knew as much about running the Army as he did. As is the case with most public figures, he had a hard time pleasing everyone. One of his chief critics called him to task for spending so much time on small details. Pershing replied:

"I am doing this now, while I have time, in order that those under me will know how my mind works when I have no time to spend on minor details."

In business, attention to detail is essential for efficient operation.

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NEWS ABOUT PEOPLE

L. C. Strobeck has been made vice president in charge of mechanical sales of the Dayton Rubber Co., Dayton, O., and will be in charge of industrial, automotive, railway, and roller sales. He succeeds T. C. Davis, resigned.

Henry Wm. Croizer, representing Marathon Rubber Footwear Co. and Empire Rubber Mills, Ltd., both importers and manufacturers at Cumner Terrace, Woolston, Christchurch, New Zealand, early last month reached this country. Interested in investigating rubber manufacture in his capacity of chemist, during his three-month stay he will visit Los Angeles, El Paso, Chicago, New York, and Akron. He may be reached at the Seiberling Rubber Co., Akron, O.

Lloyd R. Leaver, president of Joseph Stokes Rubber Co., Ltd., Welland, Ont., Canada, has been elected a vice president of The Thermoid Co., Trenton, N. J. He will manage the industrial rubber products division and also continue to direct the policies of the Canadian subsidary from Trenton.

Paul W. Litchfield, chairman of the board of the Goodyear Tire & Rubber Co., Akron, O., and president of Cia. Goodyear del Peru, has been awarded by the Republic of Peru the Order of the Sun, with grade of Knight Commander, in recognition of his contribution to the economic welfare of Peru, through the establishment five years ago of a Goodyear tire factory in Lima.

Frank D. Hendrickson, president, American Hard Rubber Co., New York, N. Y., has been elected to the advisory board of the Chemical Bank & Trust Co. of New York.

Henry B. Clark has been named manager of the New York sales office, 570 Lexington Ave., of Diamond Alkali Co., Painesville, O., to succeed Charles V. Douglas, resigned. Charles L. Flaccus, Jr., has been made assistant branch manager at New York. Mr. Clark, with the company since 1934, for the past two years was branch manager of the Boston, Mass., sales office. Mr. Flaccus, a Diamond salesman since 1933, has worked out of the New York office for the last nine years.

Herbert Fineberg has been made chief chemist of Glyco Products Co., Inc., Brooklyn, N. Y. He received his Ph.D. from the University of Illinois and worked there under C. S. Marvel on butadiene polymers and copolymers. When at Eastman Kodak Co., Dr. Fineberg worked on plasticizers, plastics, and textile lubricants and while with Connecticut Hard Rubber Co. developed a series of synthetic organic products.

Stanley Rehrback, of Seamless Rubber Co., New Haven, Conn., recently was elected president of the New Haven Personnel Managers Association.

W. J. Sears, vice president of The Rubber Manufacturers Association, Inc., New York, N. Y., has been acting as chairman of a Task Committee created to cut red tape and streamline organizational operations of the Economic Cooperation Administration. The committee is charged with improving programming and authorization procedures set up to carry out the European rehabilitation objectives of the Marshall Plan. Mr. Sears is on loan to ECA until September 1.

G. Willis Beavers has been made vice president in charge of sales of Thompson, Weinman & Co., 52 Vanderbilt Ave., New York 17, N. Y., to succeed Holland W. Smith, resigned.

Sam C. Whitehouse, assistant manager of the Kobuta, Pa., chemical plant of Koppers Co., Inc., Pittsburgh, Pa., has been named export manager of the chemical division's sales department. Upon graduation from Iowa State College, Mr. Whitehouse joined Koppers Construction Co., and after nine months as a draftsman went to the Connecticut Coke Co., where he remained 13 years. When Koppers organized a butadiene division to operate the Kobuta styrene and butadiene plant for the government in 1943, he went there as general foreman. From October, 1945, to November, 1946, Mr. Whitehouse was loaned to the Reconstruction Finance Corp., Office of Rubber Reserve, being made styrene production manager and assistant production manager of the entire program of ORR. When Koppers bought the Kobuta styrene facilities in November, 1946, he became assistant manager of that plant.

Charles V. Douglas has been appointed assistant to vice president J. P. Remensnyder in charge of sales of Heyden Chemical Corp., New York, N. Y. Mr. Douglas has been associated with Diamond Alkali Co. and its subsidiaries for 26 years.

Emil C. Schnake has been appointed sales representative for the New York Belting & Packing Co., Passaic, N. J., to cover the southwest section of the United States, with headquarters at Fort Worth, Tex.

Fordyce Jones, chairman and managing director of Reliance Rubber Co., Ltd., London, England, visited the offices of INDIA RUBBER WORLD late in August and discussed with the editor his impressions of the rubber industry in the United States, following an extended tour of plants and factories on both the East and West Coasts. Mr. Jones has many friends in the industry in this country and prior to the late war made regular trips, at least once each year, to the United States. He was appreciative of the very great progress made in the manufacture of rubber products in this country during the last several years and at the same time mentioned new machines and techniques developed in England that should be of interest to the American manufacturer.

George Waldeman Skjellerup, representing Para Rubber Co., Ltd., importer, retailer, and wholesaler, 173 Cashel St., Christchurch, New Zealand, who arrived in the United States early last month, during a three months' visit will stop off at Los Angeles, El Paso, Chicago, Akron, and New York. His address is c/o Seiberling Rubber Co., Akron, O.

V. St. C. Monteith has been appointed manager of the plant engineering department, Dayton Rubber Co., Dayton, O., to succeed the late L. B. Gordon. Mr. Monteith, who came to Dayton in 1945, has been handling special assignments in the department. Mr. Monteith formerly had been assistant chief engineer at Kelly Springfield Tire Co., Cumberland, Md.

OBITUARY

Carey L. Youngs

CARDIAC failure caused the death of Carey Leroy Youngs at his home in Glen Ridge, N. J., on August 8. Funeral services were held August 11 at Arthur K. Brown, Inc., followed by burial in Mt. Hebron Cemetery, both in Montclair, N. J.

Born in Lansing, N. Y., on February 20, 1885, Mr. Young was graduated from Groton High School, Groton, N. Y. During his career he was vice president, secretary, and director of Youngs Rubber Corp. and Youngs Export Corp., both of 145 Hudson St., and of Holland-Rantos Co., Inc., 551 Fifth Ave., all of New York, N. Y., and vice president and director of Youngs Rubber Corp., Trenton, N. J.

Mr. Youngs is survived by his wife, his mother, and two brothers, Arthur M. and Merle L., both officers of the Youngs company.

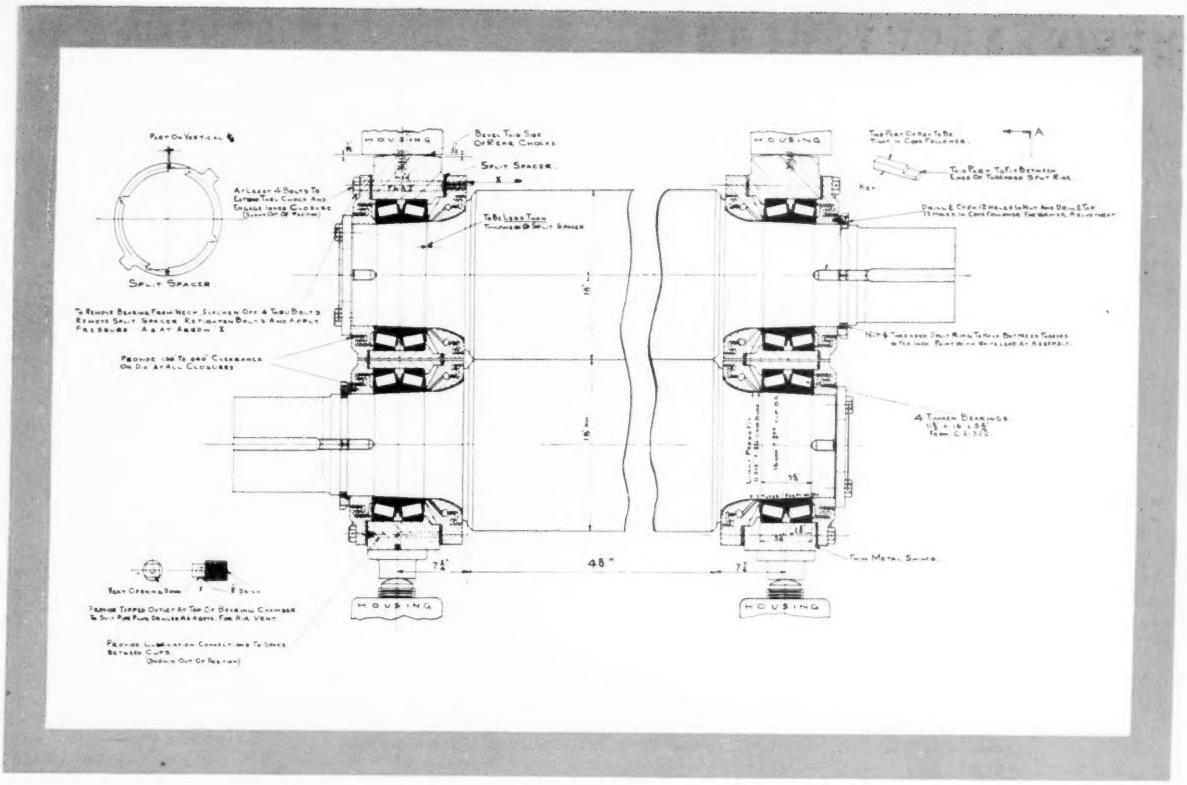
Albert F. Osterloh, Sr.

ALBERT F. OSTERLOH, SR., retired from the rubber industry since 1927, when he ended a 25-year association with the Goodyear Tire & Rubber Co., died on August 17 at his home in Los Angeles, Calif., where he long had been active in civic affairs.

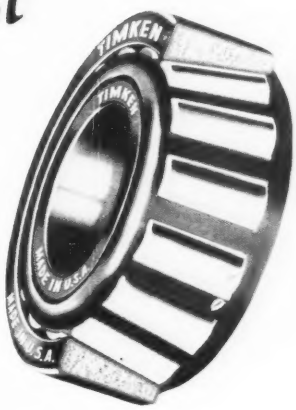
Mr. Osterloh, who was born in Pittsburgh, Pa., 75 years ago, joined Goodyear in 1902 in Chicago as a salesman. He became, successively, branch manager, manager of the western division of the sales department, assistant secretary in Akron, O., and, in 1915, secretary. In October, 1919, the deceased was elected vice president and general manager of the new Goodyear company in Los Angeles. Prior to his service with Goodyear he had been connected with Morgan & Wright Co., American Dunlop Tire Co., and Hartford Rubber Co. After leaving Goodyear he went into the advertising business.

Mr. Osterloh was a Mason, a member of Al Malaikah Temple of the Shrine, an organizer of the Los Angeles Uplifters Club, and a member of the California and Los Angeles Country Clubs.

Surviving Mr. Osterloh are his wife, two sons, and three daughters.



Modern Roller Bearing Rubber Mills Do A Better Job At Lower Cost



It's a far cry from the old two-roll rubber mill to its modern Timken bearing equipped counterpart. For many years the application of Timken bearings was the only important improvement to be made in the two-roll mill. Various other refinements have since been developed, but nothing has contributed as much to efficient, economical mill operation as the application of Timken bearings. A typical example of a Timken bearing application in a modern 18″ x 18″ x 48″ rubber mill is shown in the drawing above.

When buying new rubber mills, masticators, refiners, Banbury mixers, extruders, calenders or any other kinds of equipment, make sure they are equipped with Timken tapered roller bearings. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address "Timrosco".

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TAPERED ROLLER BEARINGS

NOT JUST A BALL ◯ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◫ AND THRUST ◫ LOADS OR ANY COMBINATION ◫

Raymond E. Palmer

RAYMOND E. PALMER, for the last year engineer and general manager of the new Mexico City project for United States Rubber Co., New York, N. Y., died suddenly August 27 in Mexico City. Services were held on August 31 at Kensico Cemetery Chapel, Valhalla, N. Y., followed by interment at Kensico.

The 57-year old executive was born in Fort Wayne, Ind. He attended Morgan Park Academy and was graduated from Dartmouth College in 1911. Two years later he was graduated from Massachusetts Institute of Technology.

Before going to Mexico, Mr. Palmer, who had joined U. S. Rubber in 1943, served as mechanical engineer on an addition to the company's Fisk tire plant in Chicopee Falls, Mass., and a wartime conversion project at the Gillette tire plant in Eau Claire, Wis. Previously he had served as operations engineer for Koppers Co. and Stevens Duryea Automobile Co. and had founded the Palmer Steel Co., Springfield, Mass. During the late war the deceased had also been an engineer for the United States Government.

A member of the American Society of Mechanical Engineers, Mr. Palmer also belonged to Phi Gamma Delta and the Sphinx Senior Society of Dartmouth.

He leaves his wife, two daughters, four brothers, and a grandson.

Robert E. Clayton

THE chief chemist and factory superintendent of The Servus Rubber Co., Rock Island, Ill., Robert E. Clayton, died August 23 in a Rock Island hospital following an operation. He became chief chemist upon joining Servus in 1927 and superintendent in 1936.

Mr. Clayton was born in Bangor, Me., September 24, 1883. A graduate of the University of Maine in 1907 with an M.S. degree in chemistry, he taught there for two years after graduation. He began his long association with the rubber industry in 1909 when he joined E. H. Clapp Rubber Co. as a chemist, but resigned in 1917 to become chemist with Apsley Rubber Co., where he remained until 1925. At that time the deceased became associated with International Shoe Co., as assistant superintendent of the sole and heel plant.

A member of the board of directors of Augustana Research, he was also a member of the American Chemical Society, Rock Island Arsenal Golf Club, Kappa Sigma, Rock Island Kiwanis, and Pheonix Lodge in Hanover, Mass.

Funeral services were held August 25 at the Knox Chapel, Rock Island, followed by a benediction at the Davenport, Iowa, Crematorium.

Surviving the deceased are the widow, a son, two daughters, and four grandchildren.

Lyle M. Geiger

LYLE M. GEIGER, 35, director of Research of The Neville Co., Pittsburgh, Pa., was drowned August 19 while fishing in a mountain stream near Grants Pass, Oregon. Mr. Geiger joined Neville in 1936 upon his graduation as chemical engineer from Lehigh University and was named director of research in 1944. For the past year and half he was stationed in Los Angeles, Calif., in charge of Neville's West Coast operations.

He was a Shriner and a member of the American Chemical Society, Pittsburgh Paint & Varnish Production Club, The Los Angeles Rubber Group, Inc., The Chemists Club of New York, Sigma Xi, and Alpha Kappa Pi.

He leaves his wife, his parents, a daughter, a stepdaughter, and a stepson.

Wendell E. Bacon

WENDELL E. BACON, since 1946 eastern technical representative for The C. P. Hall Co., Akron, O., died suddenly July 25 at his home in Palmer, Mass.

Mr. Bacon was born in Hufton, S. D., 50 years ago. He was a graduate of the University of Chicago and also attended Massachusetts Institute of Technology.

Previous to his association with the Hall company, he had been assistant to the development director of United States Rubber Co., Passaic, N. J., and from 1929 to 1934 had been in the control division of the company's Detroit, Mich., plant. From 1934 to 1941 the deceased had been a chemical engineer at the Monson, Mass., plant of the Church Mfg. Co.

Mr. Bacon was a member of Thomas Lodge A.F. & F.M.; Hampden Chapter, Royal Arch Masons; Springfield Knight Templars and the Melha Temple of the Shrine; the New England Teaching Committee of the Baha'i Faith; American Chemical Society; the Boston, Connecticut, Rhode Island, Philadelphia, and New York Rubber groups; the Chemists' Club; United States Revolver Association; the Massachusetts Committee on Public Safety, Chemical Decontamination.

He leaves his wife, a daughter, a grandson, a sister, and a brother.

Funeral services were conducted from the Beers Funeral Parlors in Palmer on July 28. The Baha'i service was followed by the Masonic service. Burial was in Hillcrest Cemetery, Springfield, Mass.

FINANCIAL

American Cyanamid Co., New York, N. Y., and subsidiaries. Six months to June 30, 1948: net income, $5,071,699, equal to $1.85 a common share, against $4,315,857, or $1.58 a share, in the like period last year; net sales, $114,208,871, against $103,555,216.

American Zinc, Lead & Smelting Co., Columbus, O., and wholly owned subsidiaries. Initial six months, 1948: net profit, $479,842, equal to 46¢ each on 673,100 common shares, compared with $666,534, or 74¢ a share, the year before; net sales, $21,147,387, against $17,613,428.

Columbian Carbon Co., New York, N. Y. Six months to June 30: consolidated net income, $3,509,540, equal to $2.18 each on 1,612,218 capital shares, against $3,231,259, or $2 a share, a year earlier.

Flintkote Co., New York, N. Y., and subsidiaries. Twenty-eight weeks ended July 17, 1948: net profit, $4,033,074, equal to $3.04 a common share, against $4,333,033, or $3.49 a share, in the 1947 period; net sales, $42,840,923, against $37,787,893.

B. F. Goodrich Co., Akron, O., and subsidiaries. Six months ended June 30: net profit, $11,023,640, equal to $7.64 each on 7,376,729 common shares, compared with $11,274,245, or $7.82 a share, in last year's half; net sales, $197,688,828, against $201,283,642; income taxes, $8,587,000, against $9,008,000; reserve for contingencies, $2,000,000 for both periods.

Pittsburgh Plate Glass Co., Pittsburgh, Pa. Six months to June 30: net income, $14,200,692, equal to $1.59 a share, against $14,802,864, or $1.66 a share, in the 1947 months; sales, $133,045,128, a new high, against $129,547,169.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
Belden Mfg. Co.	Com.	$0.30 q.	Sept. 1	Aug. 17
Brown Rubber Co., Inc.	Com.	0.25 q.	Sept. 7	Aug. 27
Brunswick-Balke-Collender Co.	Com.	0.25 extra	Sept. 15	Sept. 1
Brunswick-Balke Collender Co.	Com.	0.25 q.	Sept. 15	Sept. 1
Brunswick-Balke-Collender Co.	Pfd.	1.25 q.	Oct. 1	Sept. 20
Canada Wire & Cable Co., Ltd.	"B"	0.25 interim	Sept. 15	Aug. 31
Canada Wire & Cable Co., Ltd.	"A"	1.00 q.	Sept. 15	Aug. 31
Canadian Tire, Ltd.	Com.	0.30	Sept. 1	Aug. 20
Crown Cork International	"A"	0.40 accum.	Oct. 1	Sept. 10
Crown Cork & Seal Co., Inc.	$2 Pfd.	0.50 q.	Sept. 15	Aug. 20
Collyer Insulated Wire Co., Inc.	Com.	0.25	Aug. 2	July 26
E. I. du Pont de Nemours & Co., Inc.	Com.	2.00	Sept. 14	Aug. 23
E. I. du Pont de Nemours & Co., Inc.	$4.50 Pfd.	1.12½ q.	Oct. 25	Oct. 8
E. I. du Pont de Nemours & Co., Inc.	$3.50 Pfd.	0.87½ q.	Oct. 25	Oct. 8
Endicott Johnson Corp.	Com.	0.40	Oct. 1	Sept. 20
Endicott Johnson Corp.	Pfd.	1.00 q.	Oct. 1	Sept. 20
Flintkote Co.	Com.	0.50 q.	Sept. 10	Aug. 27
Flintkote Co.	Pfd.	1.00 q.	Sept. 15	Sept. 1
Garlock Packing Co.	Com.	0.25 q.	Sept. 30	Sept. 18
General Motors Corp.	Com.	1.00	Sept. 10	.....
General Tire & Rubber Co.	Com.	0.25 q.	Aug. 31	Aug. 20
Goodall Rubber Co.	Com.	0.10 extra	Sept. 15	Sept. 1
Goodall Rubber Co.	Com.	0.15	Aug. 16	Aug. 2
B. F. Goodrich Co.	Com.	1.00	Sept. 30	Sept. 15
B. F. Goodrich Co.	$5 Cum. Pfd.	1.25 q.	Sept. 30	Sept. 15
Johns Manville Corp.	Com.	0.35	Sept. 10	Aug. 30
Lea Fabrics, Inc.	Com.	0.37½ irr.	Aug. 31	Aug. 10
Midwest Rubber Reclaiming Co.	4½% Pfd.	0.56¼ q.	Oct. 1	Sept. 10
Minnesota Mining & Mfg. Co.	Com.	0.50 q.	Sept. 13	Aug. 25
Minnesota Mining & Mfg. Co.	Pfd.	1.00	Sept. 13	Aug. 25
Raybestos-Manhattan, Inc.	Com.	0.37½ q.	Sept. 13	Aug. 27
Seiberling Rubber Co.	4½% Pfd.	1.13 q.	Oct. 1	Sept. 15
Seiberling Rubber Co.	"A" Pfd.	1.25 q.	Oct. 1	Sept. 15
United Elastic Corp.	Com.	0.75 q.	Sept. 10	Aug. 13
United States Rubber Co.	Com.	1.00	Sept. 10	Aug.
United States Rubber Co.	8% Pfd.	2.00	Sept. 10	Aug.
Whitehead Bros. Rubber Co.	Com.	0.15	Aug. 16	Aug.

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CHEMICAL MANUFACTURERS

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APPLICATION

United States

2,444,029. **Rebreather System for Supplying Oxygen during Emergencies.** W. J. Bowen, Chevy Chase, Md.

2,444,051. **Wheel Cover Assembly of Thin, Flexible Synthetic Plastic Material.** G. A. Lyon, Allenhurst, N. J.

2,444,052. **Wheel Trim Ring of Resiliently Flexible Synthetic Plastic Material.** G. A. Lyon, Allenhurst, N. J.

2,444,059. **Laminated Structure Including Rigid Sheets of Acrylic Resin Bonded Together and Interleafed with Vinyl Chloride Polymer.** H. T. Nisher, Bristol, and La V. N. Bauer, Pa., assignors to Rohm & Haas Co., both of Philadelphia, both in Pa.

2,444,088. **Husking Roller Including a Shaft and a Laminated Cylindrical Body of Flexible, Resilient Disks, and Having Sheet Metal Disks at Either End of Body.** A. D. Becker, Columbus, Neb.

2,444,119. **In a Fluid Pressure Mechanism Including a Pair of Relative Movable Members, an Endless Elastic Deformable Packing Ring in an Annular Groove in One of the Members Forming a Sliding Packed Joint with the Other Member.** F. C. Thorn and R. M. Waples, assignors to Garlock Packing Co., all of Palmyra, N. Y.

2,444,123. **Elastic Covered Form Block for Metal Stretching Presses.** J. J. Walsh, St. Albans, assignor to Republic Aviation Corp., Farmingdale, both in N. Y.

2,444,161. **Sphygmomanometer Cuff, Inflatable Tourniquet, or the Like.** J. D. Hanafin, Chicago, Ill., assignor to W. A. Baum Co., Inc., New York, N. Y.

2,444,166. **Plastic Sheet with Thickened Lateral Edge and Pairs of Thickened Transverse Portions.** I. L. Lesavoy, Allentown, Pa.

2,444,492. **In a Laminated Light Filter, a Synthetic Resin-Synthetic Rubber Adhesive Securing a Polyamide Sheet between Glass Layers.** E. R. Blout, Cambridge, and W. F. Amon, Jr., Boston, assignors to Polaroid Corp., Cambridge, both in Mass.

2,444,569. **Flexible Packing Cup for Master Pistons.** M. Katcher, New York, N. Y.

2,444,573. **Tire Chain Structure Including a Molded Rubber Side Rim Having Reinforcing Embedded therein.** R. A. Mank, Pittsburgh, Pa.

2,444,585. **Power Transmission Belt Including a Body of Rubber-Like Material and a Pair of Endless Grommets Embedded therein.** G. H. Stewart, Akron, and E. R. Traxler, Stow, both in O., assignors to B. F. Goodrich Co., New York, N. Y.

2,444,617. **Hat Protector of Thin Flexible Material.** J. V. Samuels, assignor of 50% to O. W. Chenault, both of San Francisco, Calif.

2,444,633. **An Obturator for Sealing the Breech of Breech Loading Guns, Including a Non-Metallic Annular Pad of Resilient Composition.** A. Crossley, Bolton, England.

2,444,642. **An Apparatus to Launch a Loaded Parachute, Including a Free Balloon of the Lighter-Than-Air Type That Will Burst When Reaching a Rarified Atmosphere.** L. P. Frieder, Great Neck, and W. S. Finken, Brooklyn, both in N. Y., Finken assignor to Frieder.

2,444,653. **Drill Pipe Cleaner, Including a Flat Metal Reinforcing Ring Entirely Enclosed in a Wiper Member of Resilient Rubber Composition.** G. A. Kennedy and C. O. Moore, assignors to Gates Rubber Co., all of Denver, Colo.

2,444,699. **Roll-Neck Seal.** S. A. Hastings and C. F. Voytech, assignors to Crane Packing Co., all of Chicago, Ill.

2,444,723. **Means to Illuminate and Trim Paper, Including a Cutting Board of Plastic Material.** E. P. Bowen, Cedar Rapids, Iowa, assignor to Eastman Kodak Co., Rochester, N. Y.

2,444,737. **In an Electrical Coil, an Inner Tube and Covering of Polyamide Material.** H. P. Heath, Riverside, Ill., assignor to Western Electric Co., New York, N. Y.

2,444,760. **In Combination with a Portable Power-Driven Shaft and Coupling Element, a Detachable and Inflatable Buffing Head.** E. Tambini, Milford, Conn.

2,444,761. **Emergency Rain Garment.** V. E. Walston, Pataskala, O.

2,444,772. **For Use with a Container, a Liquid Controlling and Delivery Appliance Including a Resilient, Self-Sustaining Tube with a Transverse Cut.** R. E. Gibbes, Weedon, England.

2,444,859. **Inflatable Container and Pack therefor.** M. J. Sturtevant, assignor to Wingfoot Corp., both of Akron, O.

2,444,880. **Electrical Condenser Enclosed in a Metallic Housing Insulated from the Terminals of the Condenser by a Molded Melamine-Formaldehyde Resin Polymerized *in situ*.** P. Robinson, Williamstown, and P. H. Netherwood, assignors to Sprague Electric Co., both of North Adams, both in Mass.

2,444,904. **Bonded Rubber Joint for Couplings.** J. D. Worley, Burbank, Calif., assignor to Lord Mfg. Co., Erie, Pa.

2,444,972. **Diaper, Including a Backing Sheet of Waterproof Film of Organic Plastic Material with Pockets at Opposing Ends to Hold Disposable Absorbent Pad.** A. L. Best, Darien, Conn.

2,445,057. **Sealing Arrangement.** P. A. Driscoll, assignor to Bendix Aviation Corp., both of South Bend, Ind.

2,445,094. **Sanitary Napkin Holder of Elastomeric Sheeting.** J. A. Wald, Detroit, Mich.

2,445,196. **In a Hermetically Sealed Electric Appliance, a Base Plug of Rigid Insulating Material Covered by a Layer of Elastic Insulating Material.** H. E. West, assignor to P. R. Mallory & Co., Inc., both of Indianapolis, Ind.

2,445,220. **Sanitary Device Including a Flattened, Water-Impervious Pouch and Absorbent Pads.** S. L. Isaacson, Monrovia, Calif.

2,445,247. **Shaft Seal.** T. R. Smith, assignor to Maytag Co., both of Newton, Iowa.

2,445,284. **In a Fleshing Machine Having a Revolving Cutter and a Pair of Feed Rollers, a Sleeve of Flexible Rubber Corrugated on Its Inner Surface, on Which the Pelt Is Placed during the Fleshing Operation.** S. Tandiorio, Forest Hills, N. Y., assignor to Alaska Chemical Corp., Paterson, N. J.

2,445,325. **Insulated Container Closure, Including a Rubber Ring with a Peripheral Outer Wall and a Central Opening therethrough.** J. L. Hemp, Macomb, Ill.

2,445,410. **Shaft Sealing Means, Including a Preformed Annular Resilient Seal Member of Substantial and Uniform Thickness and of Arcuate-Shaped Cross-Section.** T. R. Smith, assignor to Maytag Co., both of Newton, Iowa.

2,445,458. **Inflatable Clothes Form.** O. L. Simonsen, Burbank, Calif.

2,445,503. **Twin Pneumatic Tire.** J. H. Williams, St. Johns, Newfoundland, Canada.

2,445,572. **In Producing a Glossy Photographic Print, Drying the Wet Print in Contact with a Glass Plate Bearing a Film of an Organosiloxane Polymer.** C. H. Geroudd and P. C. Woodland, assignors to Dow Chemical Co., all of Midland, Mich.

2,445,628. **Floating Fuel Pipe Line Including a Flexible Pipe and Flexible Pneumatic Elements Surrounding It.** J. Muller, La Garenne, Colombes, France.

2,445,657. **Toothbrush with the Bristle-Carrying Part Bendable and Formed of a Single Piece of Resilient Material.** P. G. Bennett, Boston, Mass.

2,445,665. **Welted Shoe with a Tread Including a Rubber Strip Fixed to the Welt along Its Inner Edge and the Outer Edge Folded over the Inner Edge to Form a Pocket in Which Is a Stiffening Plate, Tread Blocks, and Plastic between the Blocks.** W. H. Doherty, Elmhurst, N. Y.

2,445,694. **Urinal.** B. Predmore, assignor to Seamless Rubber Co., both of New Haven, Conn.

2,445,720. **Rubber Spring.** R. W. Brown, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,445,725. **Tread for a Pneumatic Tire.** R. C. Walker, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,445,744. **Lug Strap.** J. E. Moe, assignor to Jacobs Rubber Products, Inc., both of Danielson, Conn.

2,445,745. **Sweepstick, Including Inflexible Longitudinal Elements, an Intermediate Inflexible Element in Combination with a Resilient Element Bonded to the Inflexible Elements.** J. E. Moe, assignor to Jacobs Rubber Products, Inc., both of Danielson, Conn.

Dominion of Canada

449,188. **Boot with Upper Section of Leather and the Lower of Rubber.** E. V. Jaesar, Denville, N. J., and R. M. Plympton, Yarmouth, Me., both in the U.S.A.

449,198. **In a Buffer Including a Hollow Hub, a Solid Bushing Embracing the Hub, a Rubber-Like Ring Supported on and Embracing the Periphery of the Bushing.** P. E. Hawkinson, Minneapolis, Minn., U.S.A.

449,228. **Thermoplastic Insulated Electrical Conductor.** J. W. Olson, Sycamore, Ill., assignor to Anaconda Wire & Cable Co., Hastingsson-Hudson, N. Y., U.S.A.

449,233. **Electrically Conductive Material, Including a Network of Conductive Strands Embedded in Vulcanizable Material and Adapted for Use as a Gasket.** H. M. Robinson, Walton, assignor to Bendix Aviation Corp., New York, both in N. Y., U.S.A.

449,259. **Cable or Wire with a Wrapping Carrying an Impervious, Well-Plasticized Polystyrene Lacquer.** J. F. Morley, D. R. Beckwith and W. J. L. Wildbore, all of London, England, assignors to Western Electric Inc., assignor to International Standard Electric Corp., both of New York, N. Y., U.S.A.

449,361. **Lubricating Oils and Greases Containing Interpolymers of Styrene, Isobutylene, and a Mixture Containing Unsaturated Hydrocarbons Obtained by Cracking Paraffin Wax.** M. Pier, Heidelberg, and F. Christmann, Ludwigshafen-on-Rhine, assignors to I. G. Farbenindustrie A. G., Frankfurt a. M., all in Germany, assignor to Jasco, Inc., Linden, N. J., U.S.A.

449,403. **Windshield Wiper Including an Elastic Body Having High Coefficient of Friction and an Envelope Having a Lesser Coefficient of Friction.** J. R. Oishei, assignor to Trico Products Corp., both of Buffalo, N. Y., U.S.A.

449,432. **Sanitary Undergarment.** H. Gauthier, née Seguin, St. Elzear, P. Q.

449,443. **In Making Shell-Form Structures, the Use of an Inflatable Member Open at the Bottom, but Adapted to Assume a Size and Shape Corresponding to the Interior of the Intended Structure.** W. Neff, Los Angeles, Calif., U.S.A.

449,456. **Air Mask.** W. D. Sullivan, Astoria, L. I., N. Y., U.S.A.

449,469. **Accumulator Bladder of Flexible Material.** R. S. Miller, North Hollywood, Calif., assignor to Bendix Aviation Corp., South Bend, Ind., both in the U.S.A.

449,515. **Mounting Including a Lateral Rubber Arm I-Shaped in Cross-Section.** G. H. Kaemmerling, assignor to Lord Mfg. Co., both of Erie, Pa., U.S.A.

449,516. **Flexible Support.** P. C. Roche, assignor to Lord Mfg. Co., both of Erie, Pa., U.S.A.

449,517. **Resilient Mounting, Including a Rubber Bridging Member.** G. H. Kaemmerling, assignor to Lord Mfg. Co., both of Erie, Pa., U.S.A.

449,518. **Engine Mounting, Including Bushings of Rubber.** J. D. Worley, Burbank, Calif., assignor to Lord Mfg. Co., Erie, Pa., both in the U.S.A.

449,545. **In a Tie Rod Joint Including a Socket, a Rubber Bushing and a Molded Plastic-Impregnated Liner in the Socket.** J. H. Booth, Detroit, Mich., assignor to Thompson Products Inc., Cleveland, O., both in the U.S.A.

449,547. **In a Device for Coupling a Drive Shaft with a Propeller Hub, Including a Driving Sleeve to Receive a Drive Shaft in Keyed Relation, Rubber Blocks whereby Torque Loads Are Transmitted between Driving Sleeve and Propeller Hub.** J. H. Booth, Detroit, Mich., assignor to Thompson Products, Inc., Cleveland, O., both in the U.S.A.

449,569. **Reinforced, Rectilinear Container of Transparent Film.** A. B. Clunan, assignor to Wingfoot Corp., both of Akron, O., U.S.A.

449,633. **In a Wheel Hub Brake, Including an Expansible Brake Member, a Block of Elastically Deformable Material within the Brake Member.** T. C. Sayles, Elmira, N. Y., assignor to Bendix Aviation Corp., South Bend, Ind., both in the U.S.A.

449,674. **Resilient Bush or Bearing.** M. Goldsmith, formerly known as Max Goldschmidt, assignor to Metalastik, Ltd., both of Leicester, England.

449,695. **Soft Rubber Valve for Inflatable Articles.** W. J. Wychorley, assignor to William Sykes, Ltd., both of Horbury, Yorkshire, England.

449,699. **Seal Assembly Including a Rubber Member.** J. R. Snyder, assignor to Thompson Products, Inc., both of Cleveland, O., U.S.A.

449,700. **Joint Assembly, Including a Rubber-Backed Bearing Member.** J. H. Booth, Detroit, Mich., assignor to Thompson Products, Inc., Cleveland, O., both in the U.S.A.

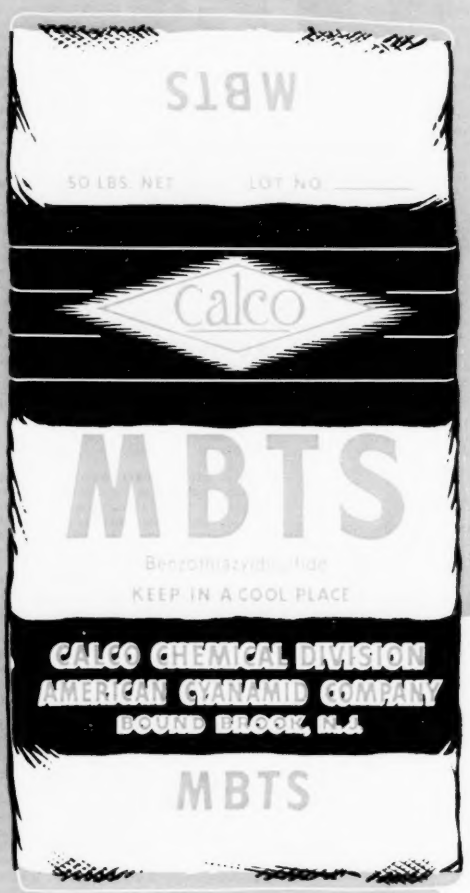
449,701. **Universal Joint Including a Rubber Sleeve to Absorb Shock Loads.** J. H. Booth, Detroit, Mich., assignor to Thompson Products, Inc., Cleveland, O., both in the U.S.A.

449,744. **Spring, Including a Wire Helix and a Core of Spongy Elastic Material.** P. G. Groom, Hamilton, Ont.

449,756. **Shampoo and Surgeon's Cape.** A. I. Morton, Kentville, N. S.

449,872. **Hollow, Noise-Making Article of Rubber.** D. C. Kemphorn, Akron, assignor to Sun Rubber Co., Barberton, both in O., U.S.A.

449,877. **Wiper Blade with a Rubber Arm**



+

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CALCO CHEMICAL DIVISION

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Calco

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Connector Pivotally Mounted thereon. A. Rappl, Eggertsville, and A. C. Scinta, assignors to Trico Products Corp., both of Buffalo, both in N. Y., U.S.A.

449,904. **In a Container Having Two Walls Movable toward and from Each Other, One Wall with a Mouth Opening and the Other with a Projecting Plug, Sealing Means, Including an Elastic Tube That Can Be Rolled Backward to Provide an Exterior Seal around the Mouth Opening.** F. Lobl, Middleboro, Mass., U.S.A.

449,991-992. **Doll Body with Rubber Skin.** A. M. Katz, Brooklyn, assignor to Ideal Novelty & Toy Co., Long Island City, both in N. Y., U.S.A.

United Kingdom

602,424. **Pressure Adhesive Tapes.** General Aniline & Film Corp.

602,448. **Seal Constructions.** Thompson Products Co.

602,490. **Resilient Suspension Systems.** W. A. Clements.

602,502. **Safety Air Tube for Tires.** A. M. C. Scognwell.

602,554. **Rubber Products.** A. Skipsey.

602,559. **Resilient Mountings.** Lord Mfg. Co.

602,598. **Flexible Coupling.** Lord Mfg. Co.

602,642. **Resilient Joints, Mountings, Etc.** M. F. A. Julien.

602,758. **Electric Cables.** Standard Telephones & Cables, Ltd., and E. C. Lee.

602,782. **Composite Films.** Wingfoot Corp.

602,790. **Heat and Sound Insulating Masses Made from Synthetic Resin Foam.** Ciba, Ltd.

602,852. **Expansion Joints for Pipe Lines.** Dunlop Rubber Co., Ltd., and A. G. Walsh.

602,897. **Elastic Suspension for Cycles, Motorcycles, and the Like.** H. Gondoux.

602,947. **Buoyant Electric Cables.** Okonite-Callender Cable Co.

602,426. **Shoe Uppers of Canvas Partly Covered with Rubber.** Hungarian Rubber Goods Factory, Ltd.

602,483. **Windshield Wipers.** J. Lucas, Ltd., R. W. Hawkeswood, and R. H. Purden.

PROCESS

United States

2,444,075. **Cable Splicing.** R. J. Violette, Washington, D. C.

2,444,150. **Forming a Hollow Article from Plastic Sheet Material.** A. L. Best, Darien, Conn.

2,444,177. **Curing Bags for Tire Casings.** J. A. Walsh, West Haven, Conn.

2,444,394. **Molding Diaphragms.** J. C. Arnold, assignor to Lane-Wells Co., both of Los Angeles, Calif.

2,444,420. **Forming Products from Sheet Thermoplastic Annealable Material.** G. W. Borkland, Marion, Ind.

2,444,805. **Vulcanizing Material upon an Annular Form.** W. H. Van Buren, Philadelphia, Pa., assignor to B. F. Goodrich Co., New York, N. Y.

2,445,042. **Treating Oriented Acrylonitrile Structures.** S. Silverman, Baltimore, Md., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,445,290. **Making Rigid Hollow Panel Structures from Thermosetting Resin Impregnated Fibrous Strip.** D. Gonda, London, assignor to Holoplast, Ltd., New Hythe, both in England.

2,445,415. **Making Insulating Board from Asbestos Fibers, a Waterproofing Agent, and Resin.** H. R. Anderson, Eureka, assignor to Kensbey & Mattison Co., Ambler, both in Pa.

2,445,537. **Electrical Outlet Plugs with Rubber Body.** E. G. Schaeffer, Holyoke, Mass.

2,445,701. **Making Tires, Including Heating in a High-Frequency Electrostatic Field.** C. W. Vogt, Norwalk, Conn.

2,445,726. **Forming and Orienting Crystalline Resinous Bodies.** W. H. Willert, Paterson, N. J., assignor to Firestone Tire & Rubber Co., Akron, O.

2,445,732. **Forming Cellular Rubber Articles Having a Synthetic Rubber Skin thereon.** M. Carter, Yardley, Pa., assignor to Firestone Tire & Rubber Co., Akron, O.

Dominion of Canada

449,251. **Extruding Polymerized Derivatives of Methacrylic Acid.** W. E. Lawson, Wilmington, Del., and C. B. Van Winter, Wenonah, N. J., both in the U.S.A., assignors to Canadian Industries, Ltd., Montreal, P.Q.

449,267. **Cold-Drawing Organic Polymeric Filament.** R. T. Fields, Arlington, N. J., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q.

449,489. **Cellular Rubber.** L. P. Dosmann, Mishawaka, Ind., U.S.A., assignor to Dominion Rubber Co., Ltd., Montreal, P.Q.

449,641. **Textile Fibers from Vinyl Resins.** E. W. Rugeley, T. A. Feild, Jr., and J. F. Conlon, all of South Charleston, W. Va., U.S.A., assignors to Carbide & Carbon Chemicals, Ltd., Toronto, Ont.

449,676. **Pressure-Sensitive Adhesive Sheeting.** J. W. Pearson, assignor to Minnesota Mining & Mfg. Co., both of St. Paul, Minn., U.S.A.

449,720. **Uniting Fabrics, at Least One of Which Contains Thermoplastic Material.** F. G. Dodge, Cumberland, Md., assignor to C. Dreyfus, New York, N. Y., both in the U.S.A.

449,842. **Coating Surfaces with Polythene Compositions.** G. C. Tyce, Watford, Hertfordshire, England, assignor to Canadian Industries, Ltd., Montreal, P.Q., assignor to Imperial Chemical Industries, Ltd., London, England.

449,869. **Gas-Expanded Cell-Tight Rubber.** H. Pfleumer, New Brunswick, N. J., assignor to Rubatex Products, Inc., New York, N. Y., both in the U.S.A.

449,888. **Forming a Toy Balloon.** J. G. Jakobsen, Copenhagen, Denmark, assignor to N. B. Bach, New York, N. Y., U.S.A.

449,926. **Continuous Process of Producing a Waterproof Fabric.** C. S. Francis, Jr., West Barwick, Mass., assignor to Sylvania Industrial Corp., Fredericksburg, Va., assignor to American Viscose Corp., Wilmington, Del., all in the U.S.A.

449,957. **Providing an Electrical Member with Insulation.** C. F. Hill, Edgewood, and N. C. Foster, Wilkinsburg, both in Pa., U.S.A., assignors to Canadian Westinghouse Co., Ltd., Hamilton, Ont.

United Kingdom

602,575. **Perforated Sheets of Thermoplastic Material.** Imperial Chemical Industries, Ltd., and W. E. F. Gates.

602,040. **Articles from Polymers or Copolymers of Vinyl Chloride.** Soc. Rhodiaceta.

602,077. **Synthetic Resinous Tubing.** C. E. Slaughter.

602,323. **Battery Separators.** United States Rubber Co.

602,402. **Light Density Polymeric Materials.** Expanded Rubber Co., Ltd., and S. Booth.

602,562. **Laminated Products.** Bakelite, Ltd.

602,842. **Drawn Filaments, Yarns, Ribbons, and Like Structures from Aromatic Polyesters.** Imperial Chemical Industries, Ltd., R. J. W. Reynolds, and L. Wood.

602,843. **Drawn Filaments, Yarns, Ribbons, Etc., from Aromatic Polyesters.** Imperial Chemical Industries, Ltd., D. McCreath, and L. Wood.

602,079. **Preforms of Synthetic Resinous Materials.** Bakelite, Ltd.

602,234. **Threads and the Like from Polyvinyl Chloride.** Soc. Rhodiaceta.

CHEMICAL

United States

2,444,024. **Conductive, Self-Setting Adhesive Composition for Electrical Connections Including a Jelly-Like Mass of a Cellulose Ester and Benzyl Alcohol, in Which Is Intimately Mixed a Finely Divided Noble Metal.** N. H. Collings and R. J. H. Beverton, assignors to Standard Telephones & Cables, Ltd., all of London, England.

2,444,057. **Improved Polymerization Process.** R. V. J. McGee, Elizabeth, N. J., assignor to Standard Oil Development Co., a corporation of Del.

2,444,094. **Producing a Composite Material by Treating a Fiber Base with a Solution of an Acetone-Soluble Resinous Copolymer of Maleic Acid, Vinyl Chloride, and Vinyl Acetate and thereafter Calendering on to the Base a Continuous Coating of a Composition Including a Polyvinyl Resin, a Flux, and a Plasticizer.** F. W. Duggan, Bound Brook, N. J., assignor to Bakelite Corp., a corporation of N. J.

2,444,263. **Preparing Fumaric Acid Adducts by Reacting Fumaric Acid and at Least One Conjugated Diene Hydrocarbon in an Aqueous Medium in a Closed Vessel at between 100 and 200° C.** L. C. Lane and C. H. Parker, Jr., both of Stamford, Conn., assignors to American Cyanamid Co., New York, N. Y.

2,444,333. **Reacting One Mol of a Dihydric Phenol with Two Mols of Epichlorhydrine or Alpha-Dichlorhydrine in the Presence of Alkali, Freeing the Resultant Resin from Any Chlorides Present, Mixing the Purified Resin with an Alkaline Catalyst, and Heating the Mixture to Harden the Resin.** P. Castan, assignor to De Trey Frères S. A., both of Zurich, Switzerland.

2,444,396. **Coating Composition, Including a Stable Aqueous Emulsion Containing Polyvinyl Acetate, Hydrophilic Colloidal Material as the Emulsifier and an Organic Liquid Conditioning Agent.** H. M. Collins, Ottawa, Ont., and G. O. Morrison, Shawinigan Falls, assignors to Shawinigan Chemicals Ltd., Montreal, both in P.Q., both in Canada.

2,444,413. **In Making Molds and Cores for Casting Molten Metal, Treating Siliceous Particles with Resin Solution and Mixing the Non-Cohering Resin-Coated Particles with a Resin Plasticizer.** B. M. Weston, Detroit, Mich.

2,444,546. **Improved Process of Vulcanizing Froth Sponge Prepared from Chloroprene Elastomers, Which Includes Incorporating in the Froth Prior to Vulcanization Zinc or Lead Oxide, Catechol, and a Dinitrobenzene.** R. H. Walsh, Woodstown, N. J., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,444,589. **Purification of Acrylonitriles and Hydroacrylonitriles.** W. A. Blann, Stamford, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,444,643. **Polymerization of Butadiene-1,3 Hydrocarbons in Acidic Aqueous Emulsion in the Presence of a Persulfate and Aluminum Chloride.** C. F. Fryling, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,444,655. **Resinous Acrylic Polymers of High Abrasion Resistance.** E. H. Krocker, Cheltenham, and W. J. Croxall, Bryn Athyn, assignors to Rohm & Haas Co., Philadelphia, all in Pa.

2,444,666. **Metal Salts of a Bis-Dithiocarbamic Acid.** R. A. Mathes, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,444,689. **Increasing the Particle Size of Synthetic Rubber Latex by Treating with a Dilute Aqueous Solution of an Ionizable Water-Soluble Salt and Dipping a Form Coated with Coagulant in the Treated Latex to Obtain a Strong Coherent Film.** E. A. Willson, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,444,712. **Light Polarizing Polyvinyl Orthoborate Films.** F. K. Signaigo, Kenmore, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,444,807. **Copolymers of Vinyl Furane and Alpha-Alkyl Acrylonitrile.** A. M. Clifford, Stow, assignor to Wingfoot Corp., Akron, both in O.

2,444,817. **Polymerizing in Mass a Mixture Including Vinyl Acetate and an Ester from the Class of the Diallyl and Dimethallyl Esters of Maleic, Fumaric, Succinic and Adipic Acids, in the Presence of Benzoyl Peroxide.** R. G. Fordyce, Dayton, O., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,444,827. **Nitromethane-Acetone-Adipic Acid Condensation Polymer.** A. Johnson, Delmar, N. Y., assignor, by mesne assignments, to Tek Hughes, Inc., a corporation of N. Y.

2,444,828. **High Molecular Weight Fatty Nitriles.** W. Kaplan, Brooklyn, assignor to Sun Chemical Corp., New York, both in N. Y.

2,444,848. **Continuous Polymerization of Isobutylene.** R. L. Purvin, Goose Creek, Tex., assignor to Standard Oil Development Co., a corporation of Del.

2,444,858. **Trimethylsilylmethylpentamethyldisiloxane.** J. L. Speier, Pittsburgh, Pa., assignor to Corning Glass Works, Corning, N. Y.

2,444,869. **Making Sponge Rubber by Preparing a Fluid Foam of a Synthetic Rubber Latex Containing Zinc Oxide, an Alkali Salt Having a Complex Ironcyanide Anion, an Alkylated Phenyl Monoether of Polyethylene Glycol and a Slightly Soluble Salt of Fluosilicic Acid.** W. J. Clayton, Mishawaka, and P. V. Butsch, South Bend, both in Ind., assignors to United States Rubber Co., New York, N. Y.

2,444,870. **Copolymer of a Mixture of an Alpha Aromatic Acrylonitrile and a Butadiene-1,3.** A. M. Clifford, Stow, assignor to Wingfoot Corp., Akron, both in O.

2,444,871. **Chewing Gum Base Incorporating a Thermosetting Resin of the Group of Urea Formaldehydes and Ketone Aldehydes in a Final State of Polymerization.** W. P. Cohoe, New York, assignor to American Chicle Co., Long Island City, both in N. Y.

2,444,881. **Preservation of 1,3-Diene Copolymers with Mono-Substituted Thioureas.** R. R. Sterrett, Totowa, N. J., assignor to United States Rubber Co., New York, N. Y.

2,444,945. **Improved Separation of Butadiene and Acetylenes.** C. E. Morrell, Westfield, N. J., assignor to Standard Oil Development Co., a corporation of Del.

2,445,084. **Plastic Composition Including Ethyl Cellulose, a Polymerized Ester of Acrylic Acid with Saturated Lower Aliphatic**

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Modified Asphaltic-Type Softener for GR-S and Natural Rubber Friction and Tread Stocks

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2,445,085. **Plastic Composition Including a Cellulose Ether, a Polymerized Ester of Acrylic Acid, and an Ester of a Polyhydroxy Alcohol and a Saturated Alpha-Hydroxy Carboxylic Acid.** C. E. Rehberg, Glenside, W. C. Mast, Philadelphia, and C. H. Fisher, Abington, all in Pa., assignors to United States of America, as represented by the Secretary of Agriculture.

2,445,181. **Composition Including an Interpolymer of a Mixture of Acenaphthylene and a Compound Containing a Polymerizable**

$CH_2=C$ Grouping. H. F. Miller and R. G. Flowers, both of Pittsfield, Mass., assignors to General Electric Co., a corporation of N. Y.

2,445,189. **Polymerization of an Unsaturated Ester of a Polycarboxylic Acid in the Presence of an Organic Peroxide Catalyst and a Hydrogen Halide, to Avoid Discoloration.** E. C. Shokal, Oakland, assignor to Shell Development Co., San Francisco, both in Calif.

2,445,191. **Vulcanizable Condensation Product Produced by Reacting a Mixture of Ethylene Dichloride and Butadiene Dichloride with a Water-Soluble Inorganic Alkaline Polysulfide.** T. A. Te Grotehuis, Olmsted Falls, O., and G. H. Swart, Wabash, Ind., assignors to General Tire & Rubber Co., Akron, O.

2,445,193. **Deashing Sulfonated Coumarone-Indene Resins.** A. Voet, New York, N. Y., assignor to Neville Co., Pittsburgh, Pa.

2,445,283. **Adding Tetramethyl Thiuramdisulfide to a Compound Including a Copolymer of a Monoisoolefin and a Conjugated Diolefin, an Oxidizing Agent, and p-Quinone Dioxime to Reduce Rate of Cure.** R. R. Sterrett, Naugatuck, Conn., assignor to United States Rubber Co., New York, N. Y.

2,445,292. **Resin Formed by Heat Condensation in the Presence of an Acid Catalyst from Hot Vanillyl Alcohol and Formaldehyde.** H. F. Lewis and I. A. Pearl, assignors, by mesne assignments, to Sulphite Products Corp., all of Appleton, Wis.

2,445,374. **Ethyl Cellulose Stabilized against the Degrading Effects of Heat and Oxygen by an Inorganic Compound of Copper.** P. van Wyck, Bland District, Va., assignor to Hercules Powder Co., Wilmington, Del.

2,445,378. **Alkoxypolyolefin Polymers.** D. W. Young, Roselle, and N. M. Elmore, Elizabeth, both in N. J., assignors to Standard Oil Development Co., a corporation of Del.

2,445,379. **Copolymer of Isobutylene and a Dialkoxy Conjugated Diolefin.** D. W. Young, Roselle, and N. M. Elmore, Elizabeth, both in N. J., assignors to Standard Oil Development Co., a corporation of Del.

2,445,553. **Pressure-Sensitive Adhesive Sheet, Including a Backing and an Insoluble Resinous Coating Resulting from Heating at 100 to 225° C in Contact with the Backing and with Oxygen a Mixture of a Peroxidic Curing Agent and a Tacky, Linear Polyester Containing Alternate Chains from Dicarboxylic Acids and 1,2-Propylene Glycol.** E. M. Beavers, assignor to Resinous Products & Chemical Co., both of Philadelphia, Pa.

2,445,555. **A Light-Polarizing, Molecularly Oriented Linear Polyvinyl Alcohol Sheet Containing an Oriented Dichroic Polyvinyl Alcohol-Polyvinylene Complex, and Having a Layer of a Polyvinyl Alcohol-Boric Acid Complex on at Least One Surface.** F. J. Binda, assignor to Polaroid Corp., both of Cambridge, Mass.

2,445,562. **Dielectric Composition Including Dichlor Alpha Nitronaphthalene and Halogenated Polyphenyl Hydrocarbon.** F. M. Clark, Pittsfield, Mass., assignor to General Electric Co., a corporation of N. Y.

2,445,579. **Sheetlike Light-Polarizing Complex of Iodine and a Polyvinyl Compound with Protective Surface Boric Acid-Polyvinyl Compound Complex.** M. Hyman, Jr., and C. D. West, assignors to Polaroid Corp., all of Cambridge, Mass.

2,445,622. **Normally Liquid Polymer of Diallyl 3-Methyl-1,2,3,6-Tetrahydrophthalate.** R. C. Morris and R. M. Horowitz, both of Berkeley, and A. V. Snider, Richmond, assignors to Shell Development Co., San Francisco, all in Calif.

2,445,642. **Plastic Composition, Including a Cellulose Compound and an Indanol Ester.** F. J. Soday, Baton Rouge, La., assignor to United Gas Improvement Co., a corporation of Pa.

2,445,643-644. **Coating Composition, Including a Drying Oil and a Hydrocarbon Resin Polymer.** F. J. Soday, Baton Rouge, La., assignor to United Gas Improvement Co., a corporation of Pa.

2,445,654. **In a Process for the Recovery of Paracoumarone-Type Resins from Polymerized Resin Oils, the Improvement of Heating the Oils in the Presence of a Urea or Thiourea.** H. L. Allen and H. G. Kleinguenther, both of Philadelphia, Pa., assignors to Allied Chemical & Dye Corp., New York, N. Y.

2,445,693. **Reacting a Gaseous Mixture of HCN and Aliphatic Non-Acetylenic Hydrocarbons at 750 to 1000° C, to Produce Acrylonitrile.** F. Porter and G. A. Nesty, both of Morristown, N. J., assignors to Allied Chemical & Dye Corp., a corporation of N. Y.

2,445,722. **Vulcanization Accelerator.** E. L. Carr and G. E. P. Smith, Jr., assignors to Firestone Tire & Rubber Co., all of Akron, O.

2,445,724. **Vulcanizing Rubber in the Presence of Di-Tetrahydrobenzothiazyl-Disulfide.** G. E. P. Smith, Jr., assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,445,727. **Transparent, Moistureproof Film, Including a Copolymer of Butadiene-1,3 and Acrylonitrile, a Vinyl Resin and a Micro-Crystalline Paraffin Wax.** S. M. Kinzinger, Montclair, N. J., assignor to Firestone Tire & Rubber Co. Akron, O.

2,445,729. **Synthesis of High-Melting-Point Tetrachlorobutane.** M. R. Radcliffe, Glen Rock, and C. E. Best, Montclair, both in N. J., assignors to Firestone Tire & Rubber Co., Akron, O.

2,445,733. **Resins from Methylene Dioxolanes.** M. R. Radcliffe, Glen Rock, N. J., and W. G. Mayes, Cuyahoga Falls, assignors to Firestone Tire & Rubber Co. Akron, both in O.

2,445,734. **Dispersion of Antioxidants in Rubber Latex.** J. C. Carl, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,445,735. **2,6-Di (Alpha, Alpha, Gamma, Gamma-Tetra-Methylbutyl)-4-Methylphenol.** L. J. Kitchen, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,445,736. **Rubber-Like Composition Composed of Copolymer of a Conjugated Diene and a Vinyl Aromatic Compound, Which Includes, as a Tackifier, a Reaction Product of Sulfur Dichloride, and Aldehyde and a Phenol.** G. W. Gottschalk, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,445,737. **Synthetic Rubber Composition Containing a Reaction Product of Sulfur Dichloride, an Aldehyde, and an Alkyl Phenol.** H. F. Albert, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,445,738. **Distillation of 2,3-Dichlorobutadiene-1,3.** W. H. Willert, Clifton, N. J., assignor to Firestone Tire & Rubber Co., Akron, O.

2,445,739. **Oriented Crystalline Filament, Including a Homopolymer of 2,3-Dichloro-Butadiene-1,3 and a Compound from the Group of Mercaptols and Mercaptals.** G. P. Rowland, Jr. Pottstown, Pa., and R. J. Reid, Canal Fulton, assignors to Firestone Tire & Rubber Co., Akron, both in O.

2,445,740. **Aqueous Rubber Composition Having Dissolved therein a Water-Soluble Salt of a Propylated Naphthalene Sulfonic Acid together with a Sulfosuccinamate.** A. R. Davis, Riverside, Conn., assignor to American Cyanamid Co., New York, N. Y.

Dominion of Canada

449,252. **Molding Composition, Including a Mixture of a Copolymer of Methyl Methacrylate with Styrene or Vinyl Acetate and Polyvinyl Acetal Resin.** M. L. Macht, Jersey City, N. J., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q.

449,254. **Rubber-Like Material Obtained by Polymerizing in Aqueous Emulsion a Mixture of 2-Chlorobutadiene-1,3 and an N-Substituted Maleic Imide.** G. L. Dorough, Niagara Falls, N. Y., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q.

449,256. **An Interpolymer of 2-Chlorobutadiene-1,3 with Di-2-Nitrobutyl Fumarate.** C. J. Mighton, Wilmington, Del., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q.

449,257. **Polymerization of a Mixture of a Vinylidene Halide with a 1,3-Diene While in an Aqueous Dispersion in the Presence of an Alkali Metal Hydroxide.** M. A. Youker, Wilmington, Del., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q.

449,259. **A Polymerizate of an Alpha, Beta-Ethylenically Unsaturated Aliphatic Carboxylic Acid Ester of an Alpha-Cyanoalcohol with a Polymerizable Conjugated Butadiene.** J. Harmon and C. J. Mighton, both of Wilmington, Del., U.S.A., assignors to Canadian Industries, Ltd., Montreal, P.Q.

449,260-261. **Thermoplastic Polyvinyl Halide Composition Containing Chlorinated Paraffin Wax.** E. F. Brookman and S. F. Pearce, Welwyn Garden City, England, assignors to Canadian Industries, Ltd., Montreal, P.Q.

449,262. **Synthetic Rubber-Like Material Obtained by Polymerizing 2-Chloro-1,3-Butadiene in the Presence of an Ester of an Aliphatic Unsaturated Carboxylic Acid Containing not More Than 4 Carbon Atoms and a Monohydric, Unsaturated, Chlorinated Alcohol Containing 3 to 5 Carbon Atoms.** F. W. Johnson, Wilmington, Del., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q.

449,263. **Reaction of a 1,3-Diene with Polyhalogenated Alkene.** W. R. Peterson, Wilmington, Del., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q.

449,265. **Copolymerization of Rubber Latex with a Monoethylenically Unsaturated Compound.** R. A. Jacobson, Landerberg, Pa., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q.

449,268. **Drying Oil-Polyvinyl Acetal Composition.** B. C. Pratt, Wilmington, Del., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q.

449,269. **Polymeric Material from a Mixture of Vinyl Fluoride with a Terminally Unsaturated Olefin in Contact with an Inert Liquid Medium and a Catalyst.** D. D. Coffman and T. A. Ford, both of Wilmington, Del., U.S.A., assignors to Canadian Industries, Ltd., Montreal, P.Q.

449,270. **Preparation of Alpha-Amino-Beta-Mercapto Acids.** M. W. Farlow, Wilmington, Del., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q.

449,274. **N-Methylamides.** M. W. Farlow, Wilmington, Del., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q.

449,276. **Obtaining Elastic Synthetic Linear Polyamide Articles by Treating Polyamide Articles with an Alcohol, Formaldehyde and a Solution of Acid Catalyst.** J. R. Lewis and D. McCreath, both of Blackley, Manchester, England, assignors to Canadian Industries Ltd., Montreal, P.Q.

449,277. **Copolymer of Fluorobutadiene and Styrene.** L. F. Salisbury, Wilmington, Del., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q.

449,278. **Dispersion of a Partially Polymerized Hydrophobic Thermosetting Resin.** G. Pitzl, Buffalo, N. Y., U.S.A., assignor to Canadian Industries Ltd., Montreal, P.Q.

449,279. **Moistureproof Wrapping Tissue Including a Resin-Containing Base Film Coated with a Partially Polymerized Hydrophobic Melamine-Formaldehyde Resin.** G. Pitzl, Buffalo, N. Y., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q.

449,280. **Treating Polymers with Acylamides and Aldehydes.** D. W. Woodward, Wilmington, Del., U.S.A., assignor to Canadian Industries, Ltd., Montreal P.Q.

449,281. **Hydrolyzed Interpolymer of a Terminally Ethylenically Unsaturated Monoolefinic Hydrocarbon Containing from 3 to 5 Carbon Atoms with a Vinyl Ester.** C. A. Sperati, North Arlington, N. J., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q.

449,303. **Semi-Conducting Composition, Including Finely Divided Anthracite Coal in a Polymerized Phenyl Ethyl Silicone.** H. H. Barker, Irwin, and L. R. Hill, Wilkinsburg, both in Pa., U.S.A., assignors to Canadian Westinghouse Co., Ltd., Hamilton, Ont.

449,338. **Reacting Butadiene with Hydrogen Cyanide by Bringing It into Contact in the Presence of a Friedel-Crafts-Type Catalyst.** D. D. Coffman and L. F. Salisbury, Wilmington, Del., U.S.A., assignors to Canadian Industries, Ltd. Montreal, P.Q., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., U.S.A.

449,357. **Reacting Sulfonated Lignin Material with Calcium Hydroxide under Autogenic Pressure in an Alkaline Water-Butanol Medium at about 300° C.** F. E. Brauns and I. A. Pearl, assignors to Institute of Paper Chemistry, all of Appleton, Wis., U.S.A.

449,385. **Manufacture of 4-Aryl-Piperidine-4-Nitrile Derivatives.** F. Bergel, N. C. Hindley, A. L. Morrison, and H. Rinderknecht, assignors to Roche Products, Ltd., all of Welwyn Garden City, England.

449,388-389. **Product of Reaction of an Alkylated Phenol with a Condensation Product of Turpentine and Phosphorous Pentasulfide.** R. L. May, Chicago, Ill., assignor to Sinclair Refining Co. New York, N. Y., both in the U.S.A.

449,390. **Thermoplastic Adhesive Composition Suitable for Moisture, Vapor-Proof Laminates Including Petrolatum and a Compatible Hard and Brittle Water Insoluble Metallic Resinate.** L. M. Burgess and G. Abson, assignors to H. P. Smith Paper Co., all of Chicago, Ill., U.S.A.

449,391. **Thermoplastic Adhesive Composition Suitable for Forming Vaporproof Laminates Including Petrolatum and a Compatible Hydrocarbon Resin and an Aluminum Soap.** L. M. Burgess and G. Abson, assignors to H. P. Smith Paper Co., all of Chicago, Ill., U.S.A.

449,460. **Interlining Material for Garments Pretreated by Impregnation with a Curable Water-Insoluble Mixture Containing a Lacquer-Type Resin, and a Plasticizer.** R. M. Fischer, Paterson, N. J., assignor to American Cyanamid Co., New York, N. Y., both in the U.S.A.

449,557. **Mercapto-Thiazoline.** L. H. Howland, Cheshire Conn., assignor to United States Rubber Co., New York, N. Y., both in the U.S.A.

LOW-VISCOSITY, POLYMERIC VINYL PLASTICIZER

PARAPLEX G-50

for plasticizing permanence, plus ease of handling

The permanent plasticizing effect of a high-molecular weight polyester plus the simplicity of incorporation and handling of a monomeric-type plasticizer — these are the outstanding advantages of Paraplex G-50 as a modifier for polyvinyl chloride, polyvinyl acetate, nitrocellulose, and acrylic resins. In addition, the low viscosity of Paraplex G-50 makes it of particular interest in dispersion compounding for dipping, molding and extruding work.

CHECK THESE ADVANTAGES

PLASTICIZING PERMANENCE — Paraplex G-50 stocks are outstanding in durability . . . retain their excellent physical properties over long and severe periods of usage.

PROCESSING EASE — For both calendering and extruding compounds, Paraplex G-50 stocks process easily—are notable for smoothness and high finish.

FAST PIGMENT WETTING — Paraplex G-50 is an excellent pigment grinding medium . . . gives better coverage, color uniformity, and pigment binding than monomeric-type plasticizers.

NON-MIGRATIBILITY — Paraplex G-50 does not migrate to the surface of vinyl films on aging . . . ends "lacquer lifting" problems.

NON-EXTRACTABILITY — Like Paraplex G-25 and G-40, Paraplex G-50 is insoluble in oils, fats, water, and aliphatic hydrocarbons—provides soft, flexible polyvinyl chloride compounds with high service resistance.

FREEDOM FROM ODOR AND TASTE — Compounds plasticized with Paraplex G-50 are eminently suitable for rainwear, packaging, tubing and other special applications where lack of odor and taste are important.

ADAPTABILITY TO DISPERSION COMPOUNDING — Free-flowing plastisols made with Paraplex G-50 show outstanding viscosity stability, and can be fluxed satisfactorily at temperatures somewhat higher than those used for monomeric-type plasticizers.

For full details on the characteristics and uses of Paraplex G-50, write for our latest bulletin. Our technical staff will be glad to answer any questions you may wish to ask—and to advise you concerning any application of Paraplex G-50 or its companion resins, Paraplex G-25 and G-40.

THE RESINOUS PRODUCTS & CHEMICAL COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

United Kingdom

601,510. **Chloronitriles.** E. I. du Pont de Nemours & Co., Inc., and O. W. Cass.

601,511. **Chloronitriles.** E. I. du Pont de Nemours & Co., Inc. O. W. Cass, and H. B. Copelin.

601,539. **N-Di-Substituted Melamines.** American Cyanamid Co.

601,568. **Polymers of Vinyl Compounds.** British Thomson-Houston Co., Ltd.

601,572. **Insulating and Dielectric Compositions.** British Thompson-Houston Co., Ltd.

601,587. **Rubber-Like Polymeric Materials.** Standard Oil Development Co.

601,596. **Halogenation of Organic Fluorine Compounds.** Imperial Chemical Industries, Ltd.

601,762. **Compositions from Vinylidene Chloride Copolymers.** Wingfoot Corp.

601,763. **Synthetic Rubber.** Wingfoot Corp.

601,807. **Vinyl Esters and Polymers and Interpolymers Derived Therefrom.** Imperial Chemical Industries, Ltd.

601,819. **Synthetic Resin.** F. H. Cargill.

601,904. **Resinous Products from Phenolic Oils.** Low Temperature Carbonization, Ltd., G. S. Pound, and S. R. M. Ellis.

601,922. **Methyl Vinyl Ketone.** Imperial Chemical Industries, Ltd., J. G. M. Bremner, and D. G. Jones.

601,932. **Partially Chlorinated Derivatives of Rubber and the Like.** Rubber-Stichting

601,938. **Silico-Organic Compounds.** B. Gluck, C. Shaw, and W. E. Smith.

602,166. **Synthetic Resin-Fatty Oil Compositions.** British Resin Products Ltd., L. R. Anthony, J. D. Morgan, and B. Frenkel.

602,203. **Organic Mercaptans and Sulfides.** J. C. Arnold (Standard Oil Development Co.).

602,665. **Porous Plastic Masses from Polymerized Vinyl Compounds.** Imperial Chemical Industries, Ltd., L. J. Cardy, G. T. Gammon, and W. Walker.

602,677. **Electrically Conductive Rubber.** Wingfoot Corp.

602,725. **Recovery of Rubber.** M. H. Carpmael (Manufacture de Caoutchouc Michelin).

602,817. **Molding Compositions.** Clark Thread Co.

602,843. **Processes Treating Rubber and the Like.** Rubber-Stichting.

602,851. **Polymerizing Isobutene with Other Polymerizable Substances.** Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij.

602,974. **Aqueous Solutions of Polyvinyl Acetate Derivatives.** Imperial Chemical Industries, Ltd., and R. R. Lyne.

MACHINERY

United States

2,444,191. **Device to Line Brakes.** A. R. Friberg, Beverly Hills, Calif.

2,444,626. **Apparatus for Continuously Transforming a Dispersion of Synthetic Rubber into a Sheet.** W. F. Bixby, Cleveland, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,444,685. **Apparatus to Form Flat-Folded Envelope Pouches of Plural-Ply Thermoplastic-Faced Material.** H. F. Waters, New York, N. Y.

2,444,831. **Extruder.** K. B. Kilborn, assignor to Wingfoot Corp., both of Akron, O.

2,444,888. **Tire Recapper.** M. D. Butterfield, Wichita, Kan.

2,445,054. **Vulcanizer.** H. L. Baker, Clovis, Calif.

2,445,405. **Mold for Use in Injection Molding of Plastic Material.** P. A. Norris, Dayton, O., assignor to General Motors Corp., Detroit, Mich.

2,445,675. **Apparatus to Produce Coated Wires by Continuous Process.** W. C. Lang, Willoughby, O.

2,445,677. **Device to Compact Plastic Material about a Band of Tension Members.** C. W. Leguillon, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,445,728. **Tire Building Apparatus.** H. D. Stevens, assignor to Firestone Tire & Rubber Co., both of Akron, O.

Dominion of Canada

448,762 - 763. **Polychrome Plastic Materials Extruder.** J. Delorme, Rhone, assignor to S. A., des Manufactures des Glaces et Produits Chimiques de Saint-Gobain, Chauny & Cirey, Paris, both in France.

448,770. **Tread Vulcanizing Mold.** E. A. Glynn, assignor to Super Mold Corp. of California, both of Lodi, Calif., U.S.A.

448,882. **Safety Mechanism for a Vulcanizing Press.** L. E. Soderquist, assignor to McNeil Machine & Engineering Co., both of Akron, O., U.S.A.

448,912. **Dryer for Coated Tape.** C. E. Blanchard, Wellesley, assignor to B. F. Sturtevant Co., Boston, assignor to B. F. Sturtevant Corp., Hyde Park, all in Mass., assignors to Westinghouse Electric Corp., Pittsburgh, Pa., both in the U.S.A.

448,938. **Tire Repair Vulcanizer.** R. Dupont, Epernay, Marne, France.

United Kingdom

601,796. **Apparatus for Pressing Plastic Sheeting.** Bakelite Corp.

602,980. **Thermoplastic Material Cutter or Trimmer.** Pye, Ltd., and J. W. Dalgleish.

602,992. **Apparatus for Manufacturing Rubber Articles, Especially Hose Pipes.** J. F. Paulsen.

UNCLASSIFIED

United States

2,444,064. **Treating Tire Cord.** H. J. Phillipp, New Orleans, La., assignor to United States of America, as represented by C. R. Wickard, Secretary of Agriculture.

2,444,462. **Tire Chain.** L. P. Morton, Great Falls, Mont.

2,444,513. **Antiskid Chain Structure.** S. Kostelny, Chicago, Ill.

2,444,856. **Tire Deflation Indicator.** P. Siever, Minneapolis, Minn.

2,444,865. **Spring Heel Adapter.** J. P. Warrington, Bellflower, Calif.

2,444,868. **Flexible Pipe Coupling with Fluid-Supported Packing.** F. M. Allen, Azusa, and C. B. Taylor, Long Beach, assignors to All-Flex Corp., Los Angeles, all in Calif.

2,445,507. **Self-Cleaning Nonskid Cross-Link for an Antiskid Tire Chain.** J. L. Batts, Rahns, Pa.

2,445,547. **Dual Tire Valve.** H. N. Wheeler, assignor to Dual Valve Co., both of Birmingham, Ala.

2,445,633. **Cable Connector.** W. Peters, Linden, assignor to Thomas & Betts Co., Elizabeth, both in N. J.

2,445,730. **Reinforced Sectional Barrel.** M. O. Kuhn, Cuyahoga Falls, assignor to Firestone Tire & Rubber Co., Akron, both in O.

2,445,731. **Tire Inspection Device.** E. V. K. Jaycox, assignor to Firestone Tire & Rubber Co., both of Akron, O.

Dominion of Canada

448,706. **Hose Coupling.** H. W. Trevaskis, Coventry, assignor to Dunlop Rubber Co., Ltd., London, both in England.

448,806. **Traction Attachment for Tires.** W. Chaussee, Granby, P.Q.

448,926. **Cable Connection.** T. H. Clark, assignor to Federal Telephone & Radio Corp., both of New York, N. Y., U.S.A.

448,955. **Galosh Heel and Lining Protector.** G. Pelletier, Ottawa, Ont.

448,988. **Means for Detecting Leaks in Electric Cables or Pipe Lines Containing Fluid under Pressure.** D. T. Hollingsworth, assignor to British Insulated Callenders Cables, Ltd., both of London, England.

United Kingdom

600,686. **Flexible Couplings for Tubular Members.** W. S. Freeman.

601,305. **Monofilament Synthetic Yarns, Strands, or Strips and Fabrics Woven therefrom.** H. A. Stevens (Firestone Tire & Rubber Co.).

601,761. **Vertical Master Brake Cylinder.** Wingfoot Corp.

602,386. **Receptacle for the Valves of Pneumatic Tires.** F. H. Long.

602,723. **Lugs, Treads, and the Like for Attachment to Vehicle Wheels.** J. Sillery

602,849. **Flexible Coupling.** D. C. Hayward.

602,952. **Separating Pneumatic Tires from the Wheels of Aircraft and Other Vehicles.** Dunlop Rubber Co., Ltd., R. F. Daw, and H. R. Fletcher.

603,180. **Grappples for Motor Wheels with Pneumatic Tires for Tractors or Other Vehicles.** Charrues Melotte, Soc. Anon.

603,226. **Joints for Inflatable Suits.** B. F. Goodrich Co.

603,707. **Tool to Strip Rubber and Other Insulations from Cables, Wires, Etc.** L. Peel and T. H. Carr.

603,787. **Tire Demounting Equipment.** M. V. Chaiko, N. Goris, L. Egoroff, and W. Polt (trading as E. & G. Machine & Tool Co.).

TRADE MARKS

United States

439,106. **Dynagrip.** Tires. Sun Oil Co., Philadelphia, Pa.

439,118. **Click-Tite.** Heels and toplifts. B. F. Goodrich Co., Akron, O.

439,134. Representation of a house. Shower curtains. House Beautiful Curtains, Inc., New York, N. Y.

439,136. **Baroness.** Footwear. Carla Shoe Mfg. Co., Lawrence, Mass.

439,160. **Twenty-first Century Fabrics.** Fabrics. Firestone Tire & Rubber Co., Akron, O.

439,161. **21st Century Fabrics.** Fabrics. Firestone Tire & Rubber Co., Akron, O.

439,226. **Harmor.** Artificial leather. H. Morris Associates, Chicago Ill.

439,246. **Halowax.** Insulating saturants, impregnants, and sealing compounds. Union Carbide & Carbon Corp., New York, N. Y.

439,326. **Plastahide.** Vinyl-type plastic sheeting for waterproof clothing. Barringham Rubber & Plastics, Ltd., Oakville, Ont., Canada.

439,404. Representation of three geometric figures containing the word: **"Ketex."** Floor tiles. Koran's Enterprises, Scranton, Pa.

500,461. **Kem-Blo.** Sponge rubber. United States Rubber Co., New York, N. Y.

500,475. **Liqua-Tex.** Footwear. Mishawaka Rubber & Woolen Mfg. Co., Mishawaka, Ind.

500,492. **Parimode.** Footwear. Consolidated Retail Stores, Inc., St. Louis, Mo.

500,493. **Beverly.** Footwear. Consolidated Retail Stores, Inc., St. Louis, Mo.

500,518. **Gristle.** Soles. Avon Sole Co., Avon, Mass.

500,524. **Camplite.** Mattresses. Hodgman Rubber Co., Framingham, Mass.

500,526. **Farmoid.** Belting. Thermoid Co., Trenton, N. J.

500,529. Representation of four penguins and the word: **"Penguin."** Belting. V. B. Clark, doing business as V. B. Clark Belting Co., Chicago, Ill.

500,534. **HC.** Belting. Gates Rubber Co., Denver, Colo.

500,559. **2B.** Maternity belts. De Luxe Girdlecraft Co., Inc., New York, N. Y.

500,560. **Hoopla.** Corsets and girdles. A. Gruber, New York, N. Y.

500,619. **Wingfoot.** Batteries. Goodyear Tire & Rubber Co., Akron, O.

500,621. **Empire.** Baby bibs, shower caps, etc. Empire Shield Co., Inc., New York, N. Y.

500,673. **Adventure.** Foot cushions. Wm. L. La Venture, doing business as Adventure Co., Huntington Park, Calif.

500,701. Representation of a duck. Waterproof shipping bags. Bemis Bro. Bag Co., St. Louis, Mo.

500,722. **Mud-Flo.** Hose. Thermoid Co., Trenton, N. J.

439,451. **Koroseal.** Tubing. B. F. Goodrich Co., New York, N. Y.

439,456. **Volacrepe.** Soles. Vol Crepe Ltd., Glossop, England.

439,458. Representation of a man and balloons. Balloons. Bayshore Industries, Inc., Elkton, Md.

439,460. **Rainchief.** Raincoats and jackets. L. Kuhn, Inc., New York, N. Y.

439,474. **the holiday line.** Swim rings and balls. Plastictronics, Inc., New York, N. Y.

439,482. ***Kids Pix*.** Balloons. Bayshore Industries, Inc., Elkton, Md.

439,512. **Artus.** Shim stock, gaskets, washers, etc., Industrial Products Suppliers, New York, N. Y.

439,515. **Dri-Topper** Hat rain covers. J. B. Mast Co., Inc., New York, N. Y.

439,517. **Amerifilm.** Vinyl plastic film. Ross & Roberts, Inc., West Haven, Conn.

439,531. **Koroseal.** Wrist watch straps. B. F. Goodrich Co., New York, N. Y.

439,553. **Koroseal.** Clothes line. B. F. Goodrich Co., New York, N. Y.

439,562. **Syntilex.** Plastic films or sheets. Plastic Film Corp., New York, N. Y.

439,563. **Syntilon.** Plastic films or sheets. Plastic Film Corp., New York, N. Y.

439,569. **Polimerator.** Electronic high-frequency generators for bonding. J. B. Cunningham, doing business as Shortwave Plastic Forming Co., Burbank, Calif.

439,575. Representation of a gold cup and the words: **"Gold Cup."** Capping, padding, etc. stock, tube repair kits, etc. Dunlop Tire & Rubber Corp., Buffalo, N. Y.

439,597. **Balenciaga.** Raincoats, garters etc. Société A Responsabilité Limitée Balenciaga, Paris, France.

439,611. **An O-Kay fashion For all weather.** Raincoats. H. Kringstein, doing business as Herman Kay Co., New York, N. Y.

439,613. **Heribol.** Plastic film. H. J. Heribert, New York, N. Y.

(Continued on page 864)

At your service

...for your products

...New plant added to WITCO facilities

now producing specialized asphalt materials

To increase the scope of its service to industry, WITCO has completed a new asphalt plant in Perth Amboy, N. J. WITCO now has three such plants strategically located so that customers in all parts of the country are easily and speedily supplied with asphalt products specially formulated to meet specific requirements.

WITCO's research and technical service staffs—thoroughly trained and experienced in asphalt materials—are ready at all times to cooperate with you in developing the exact formulation you need. Request a sample today. (And, to help us help you, please give definite specifications—or state the conditions under which the material is to be used.)

Witco Asphalts for the Rubber Industry:

Pioneer Hydrocarbons (Mineral Rubbers)—extending plasticizers for rubber compounding derived from petroleum sources. Two grades are available: "Black Diamond"* and No. 38.

Softeners for heavily loaded stocks giving marked plasticizing action without alteration of cure rate. Made in several grades to cover various applications.

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WITCO CHEMICAL COMPANY, 295 Madison Avenue, New York 17, N. Y.

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DC MOLD RELEASE EMULSION NO. 35

From Akron to Bombay!

Molders of rubber goods in all parts of the world depend upon Dow Corning Mold Release Emulsion No. 35 because this silicone release agent gives them better moldings at lower cost. From tiny grommets to tires taller than a man, floor tile to hot water bottles, crutch tips to valve diaphragms as big as wash tubs, rubber goods of almost every description are easily released from molds that stay cleaner because they are treated with DC Mold Release Emulsion No. 35.

PHOTO COURTESY BALDWIN RUBBER COMPANY

The rubber industry is sold on DC Mold Release Emulsion No. 35 because it is semi-inorganic and does not decompose to form a carbonaceous deposit. It therefore keeps molds clean 5 to 20 times as long according to reports received from the many tire and rubber companies that have been using our emulsion for a period of years. Cleaner molds mean easier release and improved finish.

These are only two of the many advantages realized by manufacturers like the Baldwin Rubber Company of Pontiac, Mich. Baldwin molds such diverse products as mechanical rubber goods for the automotive industry, shoe heels, rubber sole stock, and bicycle seats.

Experience has taught them that the very thin silicone surface formed by spraying molds with a dilute solution of DC Mold Release Emulsion No. 35 gives easy release. This silicone surface adheres to the metal and is not readily picked up by flowing stock. Non-knits, fold-overs and torn heats are therefore practically eliminated.

DC Mold Release Emulsion No. 35 can easily be adapted to your present production layout. Simply dilute the emulsion with 50 to 150 parts of water, depending upon the application, and spray or wipe the mold as often as necessary to maintain easy release.

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DOW CORNING

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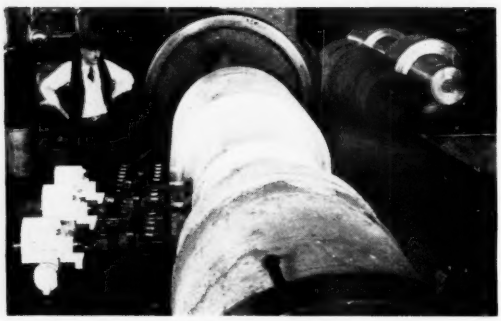
New Machines and Appliances



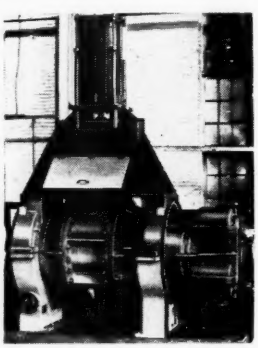
Rollafeed "Roll Turner's Helper"

Roll-Lathe Automatic Tool Feed

A ROLL-LATHE automatic tool feed which is said to insure a uniform and exact rate of tool feed has been developed by United Engineering & Foundry Co., Pittsburgh, Pa. Known as the Rollafeed, the new unit is portable and designed for easy attachment to the tool rests of new or existing roll lathes. The feed unit pushes the tool into the work in exactly the same manner as it is done by the roll turner and utilizes the same tools, wedges, supports, etc. The total weight of each unit is approximately 110 pounds, which permits easy shifting for repositioning.

The feeding mechanism is actuated by air pulsations from the existing mill air supply and is controlled by a headstock driven cam. The desired rate of feed is selected from a range of 10 steps built into the unit. Provision is made for throwing the automatic feed out of engagement to permit the operator to feed the tool by hand, if desired, when approaching the final dimension. Units may be used in multiple and can be operated as closely as a nine-inch center dimension. Actual time studies are said to show as much as 48% savings in roll turning time by use of the Rollafeed.

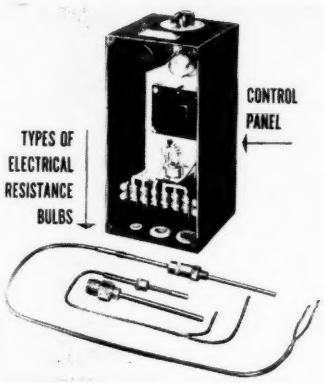
Intensive Mixer



Struthers Wells Mixer

AN IMPROVED heavy-duty intensive mixer featuring a large discharge opening which appreciably reduces loading and unloading time has been developed by Northmaster mixer department, Struthers Wells Corp., Titusville, Pa. Particularly adaptable for the rapid processing of rubber, plastics, and linoleum asphalt compositions, the mixer is equipped with a rigid construction, one-piece mixing chamber, liquid and dust tight, with no cracks or crevices in which materials can lodge. Continuous oil lubrication contributes to the shortened operating cycle of the mixer, and safety and cleaning ease are assured by the complete enclosure of all working parts. Metal-to-metal shaft seals around blade axles at trough heads resist leakage of batch materials even under the most severe operating conditions, it is further claimed.

A large ratio of jacketed areas to size of batch provides more accurate control of processing temperatures. Large-blade axle diameters and anti-friction bearing supports for both front and rear mixing elements reduce deflection of rotors under severe loading conditions. The increased rigidity and greater strength thus obtained permit closer operating clearances and absorption of peak loads without damage to equipment. The mixers are available in a wide range of sizes, working capacities, trough dimensions, and power ratings.

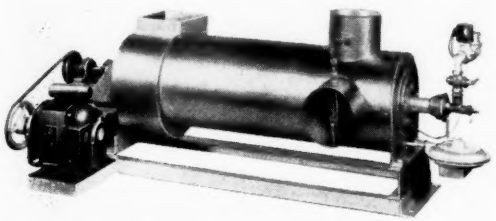


Edison Electronic Temperature Controller

Temperature Controller

A NEW temperature controller which is simple, fast, and precise in operation has been developed by the instrument division, Thomas A. Edison, Inc., West Orange, N. J. The controller is of the on-off type and uses a single electronic tube with an electrical resistance-type bulb for thermal pick-up. Use of the resistance bulb permits location of the sensing element at a point remote from the control panel and eliminates the necessity of thermal compensation.

The controller may be used to control temperatures to close tolerances in solids, gases, or liquids. Units are available to cover the temperature range from —100 to 1,200° F. and are adjustable within a range of several hundred degrees. Accuracy of the controller is independent of usual voltage variations. Normal response time is under three seconds because of the patented bulb construction. A control panel, five by five by 10 inches in size and weighing less than eight pounds complete, is furnished and is provided with conduit knockouts and a rugged terminal board.



Midget Utility Air Heater "Package" Unit

Gas Heating Package

THE midget utility air heater with improved design is now available as a complete "package" unit, including fan, motor, drive, safety devices, and temperature controller, from Gas Appliance Service, Inc., Chicago, Ill. Direct fired for maximum efficiency, this heating unit is ideal for drying rooms and small industrial ovens, including rubber curing equipment.

The heater has a heating capacity of 125,000 BTU/hour and

(Continued on page 866)

FOR FURTHER DETAILS, SEE AD ON PAGE 746

Accelerator 2-MT
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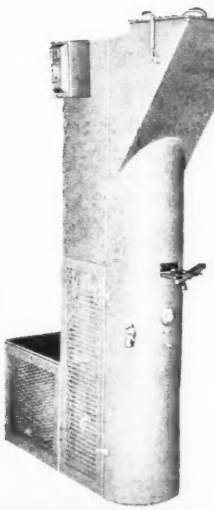
Dusting Machine



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of the industry's needs

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The Country's Leading Makers

FAR EAST

CEYLON

To Advance Rubber Manufacturing

A copy of a memorandum on the manufacture of rubber goods in Ceylon, specially prepared for the local government, has been received from W. L. Rutnam, director of Richard Pieris & Co., Ltd., and Secretary of the Ceylon Rubber Manufacturers' Association. In this memorandum the importance is stressed of encouraging local rubber goods manufacture, especially in view of the uncertainty regarding world markets for Ceylon rubber. It is recalled that though the rubber goods manufacturing industry is still in its infancy in Ceylon, yet it p'ayed its part during the war, not only retreading tires, but producing a wide range of rubber goods in short supply at the time.

Local producers, through the Ceylon RMA, gave evidence before the Rubber Commission in May, 1947; the Commission duly presented a report on the subject to the government, but as yet this does not seem to have had any consideration. The memo under discussion indicates ways in which the government can help the development of a local rubber industry. It is suggested that customs import duty be waived on machinery, plant equipment, chemicals, processed cotton, and the like, essential for the manufacture of rubber goods; that imports be prohibited of goods which Ceylon now produces in very high quality, as soles and heels, erasers, balloons, play balls, rickshaw rubber tires, cycle brake blocks, and unvulcanized rubber compounds. The interests of consumers could be protected by an Industrial Advisory Committee along the lines recommended in the Rubber Commission's Report; this committee could handle all questions of price and quality on locally manufactured rubber goods.

Again, as recommended by the Ceylon Rubber Commission, all other rubber goods made locally, as cycle spares and accessories, automobile accessories, sporting goods, toys, games, mats and mattings, wholly or mainly made of rubber, should be protected by a 60% *ad valorem* duty. It is explained that such a protective tariff would stimulate the production of an ever wider range of goods, and when local production was able to cover the whole of the island's requirements of rubber goods, further imports could be prohibited so as to stimulate production of a surplus for export.

It is further suggested that the use of locally manufactured rubber goods made of Ceylon rubber should be popularized and encouraged by the government, for only thus could Ceylon ever hope to increase volume of production to permit eventual competition in the world market.

Local manufacturers of rubber goods should be allowed a price rebate in Ceylon rubber at ceiling prices. So far rubber manufacturers in Ceylon have had to pay the government subsidized ceiling prices on rubber, which have been higher than world rates.

Several rubber companies, including Atlas Supply Co., (U.S.A.), United States Rubber Co., Dunlop, and Goodyear, are understood to be interested in the establishment of a tire factory in Ceylon. Apparently it is desired to start a factory under State sponsorship, and some of the companies are said to have sent representatives to negotiate with the Ceylon Government with this point in view.

Problems on Rubber Plantations

To save Ceylon's rubber planting industry from collapse, a ten-year program of replanting rubber has been undertaken, chiefly by European companies, on the foremost rubber producing areas in the island. Whether the program will progress as planned depends on the labor situation. At present, work on felling trees is being seriously hampered by the sudden demand by laborers for an increase in wages amounting to two rupees a day. Workers have been getting Rs. 5.50 for an eight-hour day, but are now asking for Rs. 7.50.

Following the recommendation of the Rubber Commission, the Minister of Agriculture and Lands is encouraging the conversion of uneconomic rubber plantings into paddy fields. The area of such uneconomic rubber is put at 175,035 acres, and it is proposed to give owners a subsidy of Rs. 2.50 per acre to help them make the change.

Oidium leaf disease seems to be gaining ground in certain areas in Ceylon, and it is proposed to appoint a special scientist

to do research work on the disease. S. P. Wiltshire, of the Imperial Mycological Institute, Kew, London, England, will be asked for aid in securing the services of a first-rate scientist to work in Ceylon for five years.

To help the Ceylon Rubber Research Scheme, at present in a precarious position, the government intends to increase the cess for research that is levied on rubber. This increase will be the second in a comparatively short time. In January, 1947, the cess was raised from ⅛ cent per pound to ¼ cent per pound; it is proposed to increase the amount to ½ cent per pound.

The Rubber Research Scheme has been experiencing much difficulty in recruiting suitable research workers, and it has therefore been decided to apply to the Ceylon University for five graduates in botany who would accept positions as understudies to senior officers.

MALAYA

Violence and the Plantations

At last reports the recent outbreaks of violence in Malaya had not yet subsided; on the contrary, the situation had still further deteriorated, if anything. In planting, mining, banking, and commercial circles generally, the conviction is firm that the murderous attacks and intimidations are part of a deliberate plan to overthrow the authority of the government and are not due to dissatisfaction of labor with working conditions. Apparently responsible trade union officials in the Federation agree that this is the case. This view was presented in England to Mr. Creech Jones, Secretary of State for Colonies, by a deputation representing the various interests involved, when it was urged that effective measures be taken to control the outbreaks of terrorism in Malaya. The worst affected areas have been Central and South Perak and Central Johore, where in a single week in the early part of June there were five murders and one attempted murder which could all be attributed to organized violence. In that same week there were 16 strikes on rubber estates.

A press dispatch from Singapore, dated July 19, stated that guns and ammunition had arrived by air from the United States to arm all European employes of the United States Rubber Co.'s six Malayan estates. So far, no American plantations have been attacked, but company officials felt that full precautionary steps were necessary.

A question occupying many minds now is what effect the terrorist disturbances are likely to have on Malayan outputs of rubber. According to a Reuter notice, leading trade interests in Singapore say it is still too early to make definite statements on this matter, but that available information seemed to indicate that output on large estates was being maintained and might in some cases even increase since labor was resuming work. Smallholders, however, appear to be adopting a cautious policy and, presumably feeling that wealth in rubber was safer from bandits than cash, have been slow to send their rubber to market.

Malayan Rubber Trade Notes

Dunlop Plantations reports gross receipts for 1947 of £1,119,943. Net profit was £155,787, less tax of £28,500, and there was a forward debit of £432,199. Rehabilitation work for the year cost £639,013. The tapping area of the Malayan company could be increased more than 90%, and the crop, of which 72% was concentrated latex, was almost three times the 1946 crop and 26% above that of 1941.

A merger is said to be planned by three Malayan companies, Scottish Malayan Estates, Strathmore Rubber, and Selangor Oil Palms, which have a combined issued capital of £788,258, of which Scottish Malayan has £522,526, Strathmore, £113,252, and Selangor Oil Palm, £152,480.

Negotiations for this fusion of the three companies are now at the stage where it has been proposed that Scottish Malayan Estates should make an offer to the members of the two smaller companies to take over their £1 stock units and shares on a pound for pound basis, issuing new £1 shares in exchange. The merger would be effective as from January 1, 1948, with Scottish Malayan bearing all expenses. The directors of the companies involved consider that by pooling their resources they would not only gain in financial strength, but profit in regard to supervision of estates and interchange of staff.

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VINYLUM #45 eliminates completely, aluminum dust which could contaminate plant and materials. It is 100% workable.

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Nearly 40 Singapore European, Chinese, and Indian employers, including also rubber manufacturers, importers, and dealers, have formed a Federation of Industrialists & Traders with the aim of eventually forming individual groups to deal collectively with labor questions, it is reported. Exact details regarding the constitution, objects, and names of officers of the new organization have been withheld for the time being.

A few months ago a Chinese trade mission arrived in Malaya with the double purpose of studying the rubber market with a view to buying rubber for the manufacturing industry in Hong Kong, and of exploring the Malayan market for rubber-soled canvas shoes made in Hong Kong. The mission was said also to contemplate visiting Sumatra.

Malaya imported rubber manufactures to a value of almost 4,255,000 Straits dollars[1] in the first half of 1947. Tires and tubes of all kinds accounted for more than three-quarters of the value of total imports and included 30,016 tires for motor vehicles, valued at $2,351,134 (Straits); 36,336 tubes for motor vehicles, value, $557,380; 83,899 tires for motor cycles, cycles, and tricycles, value, $272,282; and 41,068 tubes, value, $56,039. Imports of rubber footwear amounted to 39,393 dozen pairs, value, $727,175. Small quantities of other rubber goods made up the balance of the imports.

In April last, Russia was the biggest single buyer of Malaya rubber, having ordered 15,000 tons for shipment from Singapore in May. This consignment was the largest to Russia from Malaya for a single month and is almost half the total tonnage shipped to Russia in the whole of 1947. Hitherto average shipments have been under 7,000 tons. The rubber, to be collected at Singapore by two Russian ships, was bought in London by the Russian purchasing agency, and it seems that contracts for further shipments have been made.

[1]One Straits dollar equals 47¢ (app.) U. S. currency.

INDIA

Subsidized research in India has for some years now also included important work on rubber and plastics. At the Indian Institute of Science, Bangalore, work on the manufacture of polythenes by hydrogenation of rubber latex, and the manufacture of butadiene has been in progress since 1943, with Sir J. C. Ghosh as chief investigator. The manufacture of ebonite substitutes and allied products has been the subject of research by S. Siddiqui at the Council of Scientific and Industrial Research Laboratories, Delhi, since 1943. At the same laboratories S. S. Bhatnagar and Dr. Karimullah worked on the extraction of rubber from *Cryptostegia* during 1944-46; while K. S. Krishnan has been investigating plastics in general since 1940.

AUSTRALIA

The New South Wales branch of the Australasian Section of the Institution of the Rubber Industry at a Sidney meeting heard D. V. Mills, deputy director of the Standards Association of Australia, speak on "Standardization with Particular Reference to the Rubber Industry." This talk was followed by an open discussion on proposed International Standards for hardness, tensile, and abrasion testing, in the course of which it was suggested that the International Standards Committee extend its work to include plasticity testing and the setting up of international standards for crude rubber.

Cable Makers Australian, Pty. Ltd., has obtained exclusive license to manufacture in Australia a cable screened with electrically conductive rubber originally patented by a British member of the C.M.A. Extensive tests in collieries are claimed to have shown that the performance of the rubber-screened cables is in all respects equal to that of the usual metal screened cable, while it offers the advantage of freedom from damage by broken wires caused when metal screening is used.

Dunlop Rubber (Australia), Ltd., has reportedly purchased a factory at Bendigo, Victoria, where belting and other rubber products are to be produced.

Durham Chemicals (Australia) Pty. Ltd. is a subsidiary of Durham Chemicals, Ltd., (formerly Newcastle-upon-Tyne Zinc Oxide Co., Ltd.), of Birtley, Durham, England. It manufactures "Standard" and "SS Grade" and "Activated Grade" zinc oxide for the Australian rubber industry, the first two types for slow cures and the third for fast cures. Durham Chemicals intends eventually to manufacture many other chemicals of the parent organization.

EUROPE

GREAT BRITAIN

To Produce Carbon Black

England will soon be producing her own carbon black. Palatine Development Co., Ltd., has obtained from Phillips Petroleum Co., Bartlesville, Okla., U.S.A., the right to manufacture here, under a process perfected by Phillips, two types of carbon black, Philblack A and Philblack O. It is understood that the highest priorities have been promised for buildings and essential equipment of the new plant that is to have an annual output of about 50,000,000 pounds of blacks.

England has hitherto had to import practically all her requirements of blacks. In the year ended May 31, 1948, such imports included 44,143 tons of carbon black from natural gas and 4,013 tons of other types. The home-produced types have so far included lamp black and thermatomic carbon for special purposes, with facilities available for an annual output of about 9,000 tons. In the past attempts were also made to produce German-type blacks by using manufactured gas and naphthalene or anthracene oil residues (as natural gas is not available in Great Britain), but these had to be given up as uneconomical. The Phillips process for producing high-grade blacks from oil has opened the way for British manufacture of reinforcing blacks.

The Palatine concern, whose issued capital is at present held jointly by Gas Consolidation, Ltd., and Severn Valley Gas Corp., will increase its capital to finance the new enterprise. Directors are: Sir Leslie Boyce, Sir George Evetts, Col. C. P. Dawnay, G. M. Gill and R. H. Studholme.

Named to National College of Rubber Technology

The governing body of the National College of Rubber Technology, to be established at the Northern Polytechnic, London, will include the following members:

Chairman: H. Rogers, Northern Rubber Co., Ltd., *Institution of the Rubber Industry:* C. D. Law and H. Wilshaw, Dunlop Rubber Co., Ltd.; W. J. S. Naunton, Imperial Chemical Industries, Ltd.; F. M. Panzetta, British Tire & Rubber Co., Ltd.; S. D. Sutton, *Federation of British Rubber Manufacturers' Associations:* J. Frankenburg, Greengate & Irwell Rubber Co., Ltd.; G. E. Godfrey, George Spencer, Moulton & Co., Ltd. *Tire Manufacturers Conference:* M. M. Heywood, Firestone Tire & Rubber Co., Ltd.; F. G. W. King, Dunlop. *Rubber Growers' Association:* H. B. Egmont Hake. *Research Association of British Rubber Manufacturers:* J. R. Scott, L. Mullins. *British Rubber Producers' Research Association:* G. Gee, C. M. Blow. *N. J. I. C. for the Rubber Manufacturing Industry (Trade Union Representatives):* T. H. Hodgson, C. H. Beckett. *Middlesex L. E. A.:* G. Ayres. *London County Council:* G. E. Godfrey, Moulton & Co.; Miss I. Marcouse, J.P. *Northern Polytechnic:* R. L. Roberts; Sir Paul Booth; W. T. Wells; G. J. Pryke.

FOR FURTHER DETAILS, SEE AD ON PAGE 746

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For Compounding Natural and Synthetic Rubbers

Imparts Properties You Want

FOR SOLES AND HEELS—X43 imparts hardness with stiffness while improving flex life and abrasion resistance.

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FOR WIRE COVERINGS—Darex Copolymer X43 aids processing and improves dielectric properties, abrasion and cutting resistance.

FOR MOLDED GOODS — Darex Copolymer X43 gives better mold flow, tear resistance and high impact strength.

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Editor's Book Table

BOOK REVIEWS

"Liberia." Charles Morrow Wilson. William Sloane Associates, 119 W. 57th St., New York 19, N. Y. Cloth, 5¾ by 8½ inches, 226 pages. Illustrations, index. Price, $3.75.

The story of Liberia, its foundation largely as the result of the efforts of Americans of aroused conscience, its struggles during the 100 years of its existence as a Negro republic, and now the impact of the establishment of the Firestone rubber plantations on its economy and general welfare, is one that needed to be told. C. Morrow Wilson makes of it a fairly interesting, but frequently rambling narrative in which the rubber plantations play relatively the most important part, since four out of the eleven chapters of the book are devoted to the rubber industry of the country.

According to Mr. Wilson, about two-thirds of the Firestone rubber acreage is under improved clones, the preferred ones being AVROS 50 (said to be one of the best in Liberia), Bodjong Datar 5, Tjirandji 10, and Prang Besar 186; while AVROS 49 in Liberia yields latex with abnormally low D.R.C., and AVROS 256 has here proved a failure. Discussing outputs, the author says: "The overall average yield of Liberia today including seedling trees and the preponderant majority of young trees, is around 800 pounds of dry rubber per acre yearly. Thousands of acres of the older clonal rubber are scoring average yields in excess of 1,200 pounds per acre yearly; a few in excess of 1,400."

Several good clear pictures illustrate the various operations of the Firestone plantations.

Mr. Wilson's breezy style, while making for lively reading, betrays him into making some rather startling statements; planters in the East will rub their eyes when they read: "In Sumatra alone almost three-quarters of a million acres of the higher yielding clonal rubber was at or near the bearing age by the end of 1928."

Actually the total acreage of all rubber on estates in the Outer Provinces (that is, *including* Sumatra) was under 700,000 acres in 1928, and only about 17% of this total was budded. One must take issue also with the wild statement on the wrapper (for which Mr. Wilson may not be responsible, however) that Liberia's forests now produce about 17% of the world's natural rubber!

"High Polymers. Volume VI. Mechanical Behavior of High Polymers." Turner Alfrey, Jr. Interscience Publishers, Inc., 215 Fourth Ave., New York 3, N. Y. Cloth, 9 by 6 inches, 594 pages. Price, $9.50.

This volume is an attempt to uncover the fundamental principles underlying the mechanical behavior of polymeric structure and to correlate this behavior with the molecular structures involved. This book is not one of tabulated, quantitative data, but is essentially a theoretical work employing two methods of presentation. The first method, called the phenomenological discussion, gives as complete a description as possible of observed events in terms of stresses, strains, time factors, etc. This part is primarily a mathematical presentation and analysis. The second method of treatment is molecular in nature and attempts to correlate mechanical behavior with the chemical structures of polymers by means of proposed molecular mechanisms. Polymeric structures are classified, and much previously unpublished work is included. The book gives a timely account of progress in high polymers and will be of immense value to all workers in the field.

"Handbook of Chemistry and Physics." Thirtieth Edition, 1948. Charles D. Hodgman, Editor-in-Chief. Chemical Rubber Publishing Co., 2310 Superior Ave., N. E., Cleveland 14, O. Fabrikoid, 4¾ by 7 inches, 3,004 pages. Price, $6.

About 140 pages of new material have been added to this edition of the handbook. Tables on atomic and nuclear physics data have been greatly expanded, and a very complete bibliography has been added. The mathematical section has been modified by the substitution of a more convenient table of logarithms. The growing importance of synthetic rubber is reflected by the addition of a new table giving many physical properties of natural and synthetic rubber. Other changes and additions in this edition include new material on food vitamins and a revised section on viscosity data. The format of the book continues unchanged, with material divided into the following sections: mathematical tables; general chemical tables, specific gravity and properties of matter; hygrometric and barometric tables; sound; electricity and magnetism; light; quantities and units; and miscellaneous data.

NEW PUBLICATIONS

"Comparison of Calcene T, Thermax, and P-33 in Natural Rubber." Columbia Pigments Data Sheet No. 48-1. Pittsburgh Plate Glass Co., Pittsburgh 13, Pa. 8 pages. Extensive laboratory test data are presented showing Calcene T to be a satisfactory relacement for Thermax and P-33 carbon blacks where light-colored natural rubber stocks are desired. Typical formulations are given together with vulcanizate properties for different curing cycles.

"'Cumar' Paracoumarone-Indene Resin." Barrett Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y. 60 pages. This booklet describes the manufacture and grades of Cumar resin; uses, including rubber, molded products, adhesives, insulation, etc.; product data and properties, including solubilities, compatabilities, dispersions, etc.; and testing methods. An appendix, which includes property and conversion tables and a bibliography, is also given.

"Annual Report on the Progress of Rubber Technology. Vol. XI. 1947." Published by W. Heffer & Sons, Ltd., Cambridge, England, for the Institution of the Rubber Industry, 12 Whitehall St., London, S.W.1, England. Paper, 9½ by 7¼ inches, 158 pages. Price, 4/6 to members; 12/6 to non-members. This edition consists of the following articles: "Historical and Statistical Review," T. R. Dawson and C. J. Redfern; "Planting and Production of Raw Rubber, Latex, Gutta Percha, Balata, Chicle, and Jelutong," T. R. Dawson; "Properties, Applications, and Utilization of Latex," C. F. Flint; "The Chemistry and Physics of Raw Rubber and Rubber Derivatives, Gutta Percha, Balata, Chicle, and Jelutong," G. Martin; "Synthetic Rubber," B. J. Habgood; "Testing Equipment and Specifications Other Than for Latex," R. G. Newton; "Compounding Ingredients, Accelerators, Antioxidants, and Softeners, Etc.," J. Haworth; "Fibers and Fabrics," F. Chadwick; "Chemical and Physical Properties of Vulcanized Rubber," L. Mullins; "Tires," L. R. Mernagh; "Belting," N. G. Hiscox; "Hose and Tubing," F. H. Puxty; "Cables and Electrical Insulation," H. C. Harrison; "Footwear," A. W. F. Chatfield; "Mechanical Rubber Goods," S. Buchan; "Games Sports Accessories, Toys, Etc.," S. G. Ball; "Flooring," W. H. Reece; "Surgical Goods" E. H. Lenton; "Textile-Rubber Composites, Solvents, and Cements," F. T. Bowden; "Cellular Rubber," A. Cooper; "Hard Rubber," R. J. Tudor; "Works Processes and Materials, Including the Treatment of Raw Rubber in the Factory and the Treatment of Vulcanized Rubber," J. G. Anderson; and "Machinery and Appliances," H. Willshaw.

"A Pictorial Journey through the Nationwide Organization of A. Schulman, Inc." A. Schulman, Inc., 790 E. Tallmadge Ave., Akron, O. 49 pages. This handsome booklet commemorates the company's twentieth year of business. Profusely illustrated throughout, the booklet shows the company's different plants, its department heads and sales force, and describes the operations of its various divisions. Crude rubber-type descriptions, scrap rubber specifications, and various conversion tables are also included.

"Blends of Philblack O and Philblack A in Low Cost Natural Rubber Tire Treads." Philblack Bulletin No. 13, July 1948. Phillips Petroleum Co., Akron, O. 4 pages. Laboratory test data in tabular and chart forms are presented comparing the properties of two blends of Philblacks O and A with EPC black in equivalent natural rubber tread compounds. These blends can give tread stocks equal to or better than EPC black stocks in abrasion resistance and flex life with an appreciable saving in cost.

Bulletins of Koppers Co., Inc., Pittsburgh 19, Pa. **"Koppers Diamyl Phenol."** Bulletin No. C-8-110, July 15, 1948. 24 pages. The properties and uses of diamyl phenol are described, including its use in the production of plasticizers and chemicals for the rubber industry. A bibliography of 104 references is appended. **"Di-tert-Butyl-meta-Cresol (DBMC)."** Bulletin No. C-8-114, July 19, 1948. 8 pages. This bulletin deals with the properties, uses, and chemical reactions of di-tert-butyl-meta-cresol, an alkylated tar acid used in the production of sulfide derivates utilized in rubber reclaiming; in rubber compounding; in resins and plasticizers; and in certain perfume intermediates.

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"HB-40." Technical Bulletin No. P-104, June 1, 1948. Monsanto Chemical Co., St. Louis, Mo. 12 pages. HB-40, a relatively non-toxic, high boiling, colorless liquid for use in plasticizing polystyrene, vinyl resins, ethyl cellulose, asphaltic materials, and many rubber compounds, is described in this bulletin. Information and data given cover properties, compounding, results obtained, and applications.

Publications of Standard Oil Co. (Indiana), 910 S. Michigan Ave., Chicago 80, Ill. **"Indonex Plasticizers in Tire Curing Bag Compounds."** Circular No. 13-23, July 1, 1948. 6 pages. **"Indonex Plasticizers in Carcass Compounds."** Circular No. 13-24, July 1, 1948. 4 pages. These bulletins, which show properties of the Indonex plasticizers, also offer typical formulations and extensive tabulations of vulcanizate properties obtained in tire curing bag and carcass compounds, respectively.

Publications of E. I. du Pont de Nemours & Co., Inc., **"Fairprene Synthetic Elastic Compositions."** Fabrics Division, Fairfield, Conn. 12 pages. This booklet reviews the physical and chemical characteristics of the three groups of Fairprene products: sheet stocks without fabric back or cloth insert; coated fabrics; and cements made with synthetic elastomers. Typical applications are illustrated, and technical data on the products are presented in many tables and charts.

"Neoprene Type AC." Report 48-3, June, 1948. L. S. Bake. 22 pages. Neoprene Type AC is a quick-setting polymer developed for use in adhesive compositions requiring excellent stability. Laboratory test data and other information are given on the polymer and its use in cements. Topics include compounding and properties of cements, vulcanization of dried films, fabric deterioration, tack retention, and others.

"Neoprene Type S as a Processing Aid in Neoprene GR-M or GR-M-10 Compounds." BL-225, June 1, 1948. 8 pages. Laboratory test data and photographs of specimens are presented to show that Neoprene Type S added in small percentages to GR-M or GR-M-10 gives greater firmness in the uncured state, reduces mill breakdown rate, and reduces mill and calender roll sticking, but does not change the properties of the vulcanizates.

"Neoprene-Resin Mixtures." BL-226, July 31, 1948. 4 pages. Information and test data appear on combinations of neoprene and thermosetting resins that produce new materials which have high impact resistance, excellent heat resistance, and good color possibilities and may be cured in short molding cycles.

"H-P-M Smooth Line Laboratory Press." Bulletin 4801. Hydraulic Press Mfg. Co., Mount Gilead, O. 6 pages. This bulletin describes and illustrates the operation and applications of the company's new 20-ton self-contained laboratory press. The press can be used for many operations, including briquetting, tensile testing, extracting, molding, laminating, compression testing, and others, in addition to regular production work.

"Hewitt-Robins Topics." Hewitt-Robins, Inc., Buffalo, N. Y. July, 1948. 4 pages. This issue marks the reappearance of the company's house organ in a new format. The new "Topics" will be issued monthly instead of bi-monthly as in the past. The current issue contains stories of company product applications and general news activities.

"The New Electromatic Testing Machine." Bulletin 37. Tinius Olsen Testing Machine Co., Willow Grove, Pa. 4 pages. This bulletin describes and illustrates a new all-electronic low-capacity universal testing machine designed to fulfill the demand for an extremely accurate, highly sensitive testing machine. The Electromatic has a load range of 250 to one, extension ranges of 200 to one, and straining ranges of 400 to one.

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(Continued on page 866)

FOR FURTHER DETAILS, SEE AD ON PAGE 746

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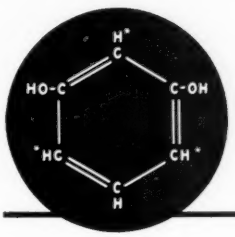

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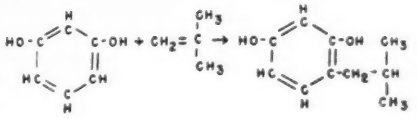

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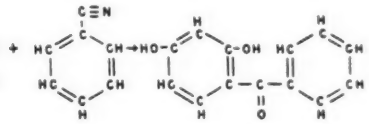

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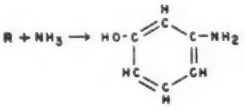

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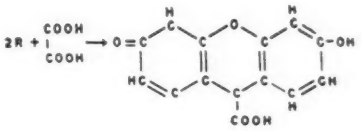

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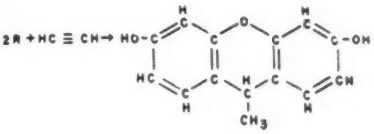

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Market Reviews

CRUDE RUBBER

Commodity Exchange

WEEK-END CLOSING PRICES

	June 26	July 31	Aug. 7	Aug. 14	Aug. 21	Aug. 28
Aug.	21.78	23.10	22.95	21.35	20.30	
Sept.	21.85	23.00	22.85	21.25	20.20	21.00
Oct.	21.85	23.02	22.80	21.21	20.28	20.97
Nov.	21.85	23.02	22.75	21.18	20.36	21.07
Dec.	21.88	23.05	22.70	21.20	20.30	20.90
1949						
Jan.	21.73	23.00	22.66	21.11	20.40	20.90
Feb.	21.60	22.94	22.63	21.08	20.35	20.90
Mar.	21.47	22.88	22.60	21.05	20.30	20.90
Apr.	21.32	22.80	22.55	20.97	20.27	20.87
May	21.15	22.75	22.50	20.90	20.25	20.85
June	21.10	22.70	22.45	20.85	20.20	20.80
July	21.05	22.65	22.40	20.80	20.15	20.75
Aug.	21.00	22.60	22.35	20.75	20.10	20.70
Sept.		22.55	22.30	20.70	20.05	20.65
Oct.		22.50	22.25	20.65	20.00	20.65

THE rubber futures market on the Commodity Exchange was very quiet and listless during the first week of August. A sharp price decline began in the second week as a result of nervousness among Far Eastern sellers over the ability or intention of Russia to take up her August commitments. This uncertainty, reflecting apprehension that heavy supplies would be unloaded on world markets, brought sharp declines in the London and the Singapore markets and, in turn, the Commodity Exchange. Despite some occasional breaks brought on by technical readjustments in the market and a renewed wave of consumer buying as prices fell, the market moved downward during the remainder of the month, reflecting the continued decline in foreign markets. The decline was not, in general, viewed with alarm because of the strong statistical position of rubber stemming from the continuing high level of manufacturing activity in the rubber industry.

September futures opened the month at the high of 23.20¢, then began to fall, reaching 22.80¢ on August 9, 21.00¢ on August 17, and the monthly low of 19.95¢ on August 25. After August was taken off the board, September prices rose to close the month at 20.75¢. As in the past month, major interest centered in December futures, which began the month at the high of 23.20¢, fell to the low of 20.05¢ on August 25, and closed at 20.85¢ on August 31. Despite the greater demand evidenced from the industry, the total volume of sales for the month was quite low, reaching 12,150 tons, as compared with the very low level of 11,040 tons sold during July.

Commodity Exchange quotations no longer reflect the market price of No. 1 R.S.S. and will not do so while the present wide differentials between the No. 1 and No. 3 sheets exist and the Exchange allows optional deliveries to be made, according to Lockwood's August *Rubber Report*. The outside market on August 11 for No. 1X R.S.S. for September was 24.50¢; whereas the same month closed on the Exchange at 22.40¢, a difference of 2.10¢ per pound. The Exchange price reflects the price of No. 3 R.S.S. for September at 21.13¢, plus the Exchange's fixed No. 3 R.S.S. discount of 1¢, plus certification at about 5 16¢, making a total differential of 1-5 16¢. The outside market's differential between the No. 1 and No. 3 grades is actually closer to 3.25¢ per pound. Obviously no trader will buy No. 1 R.S.S. on the outside market at 24.50¢ for delivery on the Exchange at 22.40¢; so in effect the grade delivered at the present time is No. 3 R.S.S.

This problem of true market prices versus grade differentials is being studied by the Exchange and it is expected that a new standard contract will be developed and adopted in the near future. Such a new contract based on these factors will do much to restore the Exchange's normal hedging function and decrease the quantity of purely professional trading.

New York Outside Market

WEEK-END CLOSING PRICES

	June 26	July 31	Aug. 7	Aug. 14	Aug. 21	Aug. 28
No. 1 R.S.S.*						
Aug.	22.50	25.00	25.00	23.63	22.75	22.75
Sept.	22.50	24.75	25.00	23.63	22.75	22.75
Oct.	22.50	24.75	24.88	23.50	22.63	22.75
Nov.-Dec.	22.38	24.75	24.75	23.38	22.50	22.63
Jan.-Mar.		24.25	24.25	23.13	22.25	22.38
Apr.-June		23.63	23.50	22.50	21.75	21.75
No. 3 R.S.S.	21.00	22.25	22.25	20.50	19.75	20.00
No. 2 Brown	18.00	18.38	18.50	17.25	17.00	17.00
Flat Bark	12.00	12.25	12.25	11.75	11.00	11.50

ALTHOUGH trading on the New York Outside Market during August was heavier than in the past few months, prices declined, following the trend of the foreign markets. Even occasional flurries of active buying by domestic consumers had little effect on prices, causing only temporary recoveries that were quickly wiped out in succeeding drops.

No. 1 R.S.S. for spot delivery opened the month at 25.00¢, then declined to reach the low of 22.00¢ on August 26, and closed at 22.88¢ on August 30, the last day of trade for this contract. An innovation in the market was the grouping of August and September prices for No. 1 R.S.S., with October deliveries quoted at a 0.25-0.50¢ discount.

No. 3 R.S.S. for spot delivery was 22.25¢ on August 2, reached a low of 19.00¢ on August 26, and closed the month at 20.00¢. No. 2 Brown started the month at 18.50¢, fell to the low of 16.25¢ on August 26, and ended the month at 17.00¢. Flat Bark prices showed the same downward trend, falling from the high of 12.75¢ on August 2 to the low of 11.00¢ on August 19, 20, and 26 and closing the month at 11.38¢.

Latices

CONSUMPTION of *Hevea* latex in the United States remains at a level of more than 2,000 long tons, dry weight, per month, and is expected to show a slow but steady increase, according to Arthur Nolan, Latex Distributors, Inc., writing in Lockwood's August *Rubber Report*. Mr. Nolan gives June *Hevea* latex imports as 2,228 long tons, dry weight; consumption, 2,273 long tons; and month-end stocks, 9,137 long tons. Six-month totals for *Hevea* latex are estimated as follows: imports, 17,328 long tons; and consumption, 12,154 long tons. GR-S latex production in July is estimated at 1,423 long tons, dry weight, giving a six-month total of 11,231 long tons. Bulk prices for *Hevea*, GR-S, neoprene, and nitrile rubber latices remained unchanged during August. Stocks of *Hevea* latex are still at an all-time peacetime high, with over four months' supply on hand.

The recently announced ocean freight rate increase on latex from the Far East, effective October 1, may appear as an increase in the price of *Hevea* latex. Practically all imports of *Hevea* latex are of creamed and centrifuged concentrates, with receipts of 38% normal and special-purpose types at negligible levels.

World consumption of latex is mounting steadily. Mr. Nolan estimates the 1948 world consumption rate of latex at 48,000 long tons, dry weight, with stocks at the end of 1947 consisting of 10,000 long tons *Hevea* latex, and shipments of *Hevea* latex during 1948 estimated at 50,000 long tons. In view of the slow rate of increase in world consumption of latex, it is expected that supplies can be kept abreast of demand for some time.

Fixed Government Prices*

Guayule	
Guayule *(carload lots)*	$0.17½
Latex†	
Hevea, normal *(tank car lots)*	.30¾
Centrifuged *(tank car lots)*	.32½
GR-S, Type 2 *(tank car lots)*	.18½‡
(Carload, drums)	.268
(Less carload, drums)	.273
Types 3 and 4 *(tank car lots)*	.18½‡
(Carload, drums)	.26
(Less carload, drums)	.26½
Type 5 *(tank car lots)*	.20¼‡
(Carload, drums)	.27¾
(Less carload, drums)	.27¾
Plantation Grades	
No. 1X Ribbed Smoked Sheets	.23
1X Thick Pale Latex Crepe	.29
1 Thick Pale Latex Crepe	.29
2 Thick Pale Latex Crepe	.28½
3 Thick Pale Latex Crepe	28¾
1X Thin Pale Latex Crepe	.29
1 Thin Pale Latex Crepe	.29
2 Thin Pale Latex Crepe	.28½
3 Thin Pale Latex Crepe	.28¼
Liberian A	.28⅝
AA	.29
RCMA Watermarked Crepe No. 16	.37⅞
17	.32⅜
18	.30⅞
Sole Crepe Trimmings	.28½
No. 1X Thin Pale Latex Crepe Trimmings	.28½
1X Brown Crepe	.21⅞
2X Brown Crepe	.21⅝
2 Remilled Blankets (Amber)	.21¾
3 Remilled Blankets (Amber)	.21⅝
Rolled Brown	.18½
Synthetic Rubber	
GR-M (Neoprene GN)	.32
GR-M-10 (Neoprene GN-A)	.32
GR-S (Buna S)	.18½
GR-I (Butyl)	.18½
Wild Rubber	
Upriver Coarse (crude)	.12⅝
(Washed and dried)	.20¼
Islands Fine (crude)	.14⅝
(Washed and dried)	.22½
Caucho Ball (crude)	.11⅝
(Washed and dried)	.19½
Mangabiera (crude)	.08½
(Washed and dried)	.18

* For a complete list of all grades of dry rubbers see Rubber Reserve Co. General Sales and Distribution Circular, July 1, 1945, as amended.
† Prices per pound total solids.
‡ Plus average freight charge of 0.75¢ per pound dry weight.

RECLAIMED RUBBER

THE reclaimed rubber market was quiet during August, reflecting the usual seasonal slowness. Despite the summer inactivity, demand, production, and exports

NOW...

Buna S Latex, PRE-VULCANIZED (UBS B-1720) CONCENTRATED

. . . 2000 lbs. tensile strength minimum
. . . dry, non-tacky film
. . . no adding of vulcanizing agents . . . no heat treatment necessary other than drying

PROPERTIES

1. Dried film tensile strength . . . 2000 lbs. per sq. in. minimum
2. Dried film ultimate elongation . 700% to 800%
3. Viscosity ..... Thin
4. Specific gravity 1.025
5. pH Value ..... 9.3 to 9.8
6. Solids content ..... 53% ± 0.5

APPLICATION

1. Back coating of rugs and fabrics to impart non-slip and fibre binding characteristics.
2. Coating and impregnating of fabric, paper and wadding for strength, water resistance, and base for further coating.
3. Preparation of molds utilizing properties of flexibility and freedom from further heat treatments.
4. Dipped goods where deposition of film is complete on drying.
5. Adhesive for paper, fabric and leather where bond is improved by film deposit of cured Buna S.
6. As an additive to natural latex, as well as to buna and neoprene, for extension and modification.

Write for detailed data sheet.

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UNION BAY STATE
Chemical Company Inc.
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Regular and Special Constructions of

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Single Filling **Double Filling**
and
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Ducks

HOSE and BELTING
Ducks

Drills

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Osnaburgs

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320 BROADWAY
NEW YORK

of reclaimed rubber were still at good levels, and an upswing in demand is expected next month as the rubber industry picks up for its fall production.

Final May and preliminary June statistics on the reclaimed rubber industry are now available. Production of reclaim during May totaled 21,043 long tons; consumption, 21,975 long tons; exports, 948 long tons; and month-end stock, 36,612 long tons. Preliminary figures for June show a production of 22,547 long tons; consumption, 23,527 long tons; exports, 925 long tons; and end-of-month stocks, 35,706 long tons. Estimates for the first half of the year, including the preliminary June figures, follow: production, 138,793 long tons; consumption, 140,445 long tons; and exports, 5,900 long tons.

No changes occurred in reclaimed rubber prices during August.

Reclaimed Rubber Prices

	Sp. Gr.	¢ per Lb.
Whole tire	1.18-1.20	8 / 8.5
Peel	1.18-1.20	9 / 9.5
Inner tube		
Black	1.20-1.22	12.75/13.25
Red	1.20-1.22	13.5 /14
GR-S	1.18-1.20	9.5 /10
Butyl	1.16-1.18	8.5 / 9
Shoe	1.50-1.52	8.25/ 8.75

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

RAYON

DOMESTIC deliveries of rayon during July amounted to 94,900,000 pounds, 2% above the June level; while deliveries during the first seven months of this year were 632,400,000 pounds, 19% above the 1947 figure. Filament yarn shipments in July totaled 72,600,000 pounds, consisting of 47,200,000 pounds of viscose and cupra and 25,400,000 pounds acetate. Yarn deliveries for the period January through July were 15% higher than those a year ago.

Cumulative advances in material and labor costs resulted in a 2-3¢ per pound increase in tire yarn and fabric prices during August. In the case of certain suppliers these advances were the first to be made since February, 1947. Current prices for high-tenacity rayon tire yarns and fabrics are listed below.

Rayon Fabrics

Tire Yarns	
1100/480	$0.55 / $0.56
1100/490	.57
1150/490	.57
1650/720	.54 / .56
1650/980	.56
1900/980	.56
2200/960	.55
2200/980	.55
Tire Fabrics	
1100/490/2	.71
1650/980/2	.685 / .70
2200/980/2	.67

SCRAP RUBBER

ACTIVITY in the scrap rubber market during August was at a low point, with hardly any movement of tires and tubes. Although there were reports of some sales below quoted market levels, scrap rubber prices remained unchanged except for mixed auto tires, which declined from $12.50 to $12.00 per net ton in the East.

The stagnant market could be attributed to three factors: (1) the good supply of natural rubber; (2) the sizable inventories of scrap rubber built up by the reclaimers who now, with outlets narrower than in the past, are reluctant to hold on to large reserves of scrap and are therefore keeping purchases at a minimum; and (3) the reduction in scrap export trade during the past few months resulting from currency shortages, difficulties in securing import licenses, and the delay by the Joint Export-Import Agency in opening scrap rubber purchasing. Trade observers believe that a wide potential market still exists abroad for scrap rubber, particularly in Spain, Italy, and Germany, but must wait upon the JEIA for action. In view of the above factors, opinions as to the duration of the current market dullness are varied, and most dealers have adopted a wait-and-see attitude.

Following are dealers' buying prices for scrap rubber, in carload lots, delivered to mills at points indicated:

	Eastern Points (Per Net Ton)	Akron, O. (Per Net Ton)
Mixed auto tires	$12.00	$13.00
S.A.G. passenger (natural)	nom.	nom.
Truck (natural)	nom.	nom.
Peelings (natural), No. 1	50.00	50.00
No. 2	31.00	31.00
No. 3	29.00	29.00
	(¢ per Lb.)	
Mixed auto tubes	4.00	4.00
Red passenger tubes	6.75	7.00
Black passenger tubes	5.00	5.00
Truck tubes	4.75	4.75
Mixed puncture-proof tubes	0.50	0.50
Air brake hose	nom.	nom.

COTTON AND FABRICS

NEW YORK COTTON EXCHANGE
WEEK-END CLOSING PRICES

Futures	June 26	July 31	Aug. 7	Aug. 14	Aug. 21	Aug. 28
Oct.	32.88	32.07	31.65	31.16	30.92	30.71
Dec.	32.58	32.03	31.73	31.21	31.00	30.71
1949						
Mar.	32.38	32.02	31.77	31.15	30.97	30.67
May	32.21	31.88	31.66	30.90	30.76	30.45
July	31.90	31.42	31.29	30.09	29.61	30.05
Oct.	29.88	29.52	29.30	27.70	27.20	26.91

TRADING on the New York Cotton Exchange during the first week in August was in better volume than in the few preceding weeks, but there was a decided tendency on the part of traders to withhold commitments pending issuance of the first official 1948 domestic crop forecast. Another question mark was the status of Japanese and ECA cotton buying. On August 9 the United States Department of Agriculture issued its forecast of a surprisingly large cotton crop of 15,169,000 bales, nearly two million bales more than the trade had expected. The estimate was based on indications that the acre yield will be the highest on record. Such a crop would be the seventh largest on record, and about 28% greater than last year's crop. Domestic requirements have been estimated at about 8,250,000 bales, and exports at 3,500,000 bales, leaving a carry-over of 3,419,000 bales. This extra supply added to a carry-over of about 2,392,000 bales from previous crops would give a total reserve of about 5,811,000 bales.

Under the impact of this crop estimate, reports that the Department of Agriculture was either unwilling or unable to institute crop controls next year, and a belief that government parity prices on next year's crop will be substantially lower than this year's level, the market moved steadily downward and went under the 1948-1949 loan level. The drop in prices attracted mill buying, and some recovery took place toward the end of the month. Assisting this recovery were reports that the export plans of ECA will be ready by September 15 and that shortly after that the European market will be an important outlet for domestic cotton. It was pointed out that world demand for textiles is still strong despite the quiet domestic textile market.

As for price movements during August, the 15/16-inch middling spot price started the month at 33.05¢, reached the peak of 33.06¢ on August 3, began falling during the second week of the month to reach the low of 31.52¢ on August 23, and closed the month at 31.73¢. October futures prices showed similar movement, beginning at 31.75¢, reaching the high of 31.76¢ on August 3, falling to the low of 30.57¢ on August 23, and ending the month at 30.80¢.

On August 13 new margin requirements went into effect on the Exchange and consisted of a reduction of $5-10 a bale. The new margin rates are as follows: $10 a bale, or 2¢ a pound, on transactions up to 33¢ a pound; $15 a bale for sales at 33.01-36.00¢; $20 a bale for sales 36.01-39.00¢; $25 a bale for sales at 39.01-42.00¢; and an additional $5 a bale margin for each advance in sales price of 3¢ a pound.

Fabrics

With a good share of third-quarter production already sold, the wide industrial gray goods industry looked forward to a healthy market for the next few months. Inventories were at the mill level and are being steadily worked off. In general, the market was described as coming closer to the prewar pattern and being steadier, with most buying confined to a period of 30-60 days ahead.

Wide sateens were becoming scarcer for September delivery, with most mills reporting that they were almost completely sold out. Chafers presented a hopeful prospect to producers. The tire trade, which has not bought too heavily during the summer, was reported ready to come into the market for September and October business. Some houses reported that they have already booked small amounts of chafer business for November. Prices have remained unchanged in the chafer field, and most emphasis has been placed on the the single filled construction luring recent sales.

Industrial drills and twills maintained a good sales pace last month, with all constructions in approximately equal demand. Moderate demand was noted in the wide and sail ducks field, with most sales made for nearby delivery. Hose and belting ducks were moderately active and priced at 68½¢. The osnaburg market was quiet again during August, but no price changes occurred despite the absence of demand. The sheeting market showed some firming up of prices, particularly in bag sheetings, which were in greatest demand.

The tug of war between price-conscious buyers and high cost-conscious manufacturers continues. During the next two months the industry will decide whether to continue production curbs.

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SYNTHETIC RESINS

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FOR NONMARKING SOLES, HEELS AND TOPLIFTS
TO OBTAIN

★ EXCELLENT ABRASION RESISTANCE

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COMPOUNDING INGREDIENTS

Current Quotations*

Abrasives

Pumicestone, powdered	lb.	$0.03½	$0.0425
Rottenstone, domestic	ton	36.00	43.00

Accelerators, Organic

A-10	lb.	.40	.47
A-19	lb.	.52	.58
A-32	lb.	.59	.69
A-77	lb.	.42	.55
A-100	lb.	.42	.55
Accelerator S	lb.	.75	
49	lb.	.44	.45
552	lb.	1.63	
808	lb.	.59	.61
833	lb.	1.13	1.15
Acrin	lb.	.65	
Advan	lb.	.55	
Aero AC 50	lb.	.50	.56
165	lb.	.37	.39
Altax	lb.	.35	.445
Antox	lb.	.54	.56
Arazate	lb.	2.16	
Beutene	lb.	.59	.64
B-J-F	lb.	.27	.32
Butasan	lb.	1.00	
Butazate	lb.	1.00	
Butyl Eight	lb.	1.00	1.05
Zimate	lb.	1.00	
Captax	lb.	.27	.345
C-P-B	lb.	1.95	
Cumate	lb.	1.45	
Cuprax	lb.	.60	.62
Diesterex N	lb.	.50	.57
DOTG (diorthotolylguanidine)	lb.	.44	.50
DPG (diphenylguanidine)	lb.	.39	.45
El-Sixty	lb.	.39	.46
Ethasan	lb.	1.00	
Ethazate	lb.	1.00	
Ethyl Thiurad	lb.	1.00	
Tuads	lb.	1.00	
Tuex	lb.	1.00	
Zimate	lb.	1.00	
Ethylidine aniline	lb.	.42	.43
Formaniline	lb.	.36	.37
Good-Rite Eric	lb.	.53	.55
Hepteen	lb.	.42	.48
Base	lb.	1.80	1.90
Ledate	lb.	1.00	
M-B-T	lb.	.27	.33
M-B-T-S	lb.	.35	.41
Mertax	lb.	.37	1.44
Methasan	lb.	1.00	
Methazate	lb.	1.00	
Methyl Selenac	lb.	1.60	
Tuads	lb.	1.10	
Zimate	lb.	1.00	
Monex	lb.	1.10	
Mono-Thiurad	lb.	1.10	
Morfex 33	lb.	.53	.58
O-X-A-F	lb.	.34	.39
Pentex	lb.	.74	.84
Flour	lb.	.1225	.1325
Permalux	lb.	1.18	1.20
Phenex	lb.	.40	.45
Pipazate	lb.	1.53	
Polyac	lb.	1.40	
Rotax	lb.	.39	.42
S. A. 52	lb.	1.10	
57, 62, 67, 77	lb.	1.00	
66	lb.	1.45	
Safex	lb.	1.15	
Santocure	lb.	.53	.60
Selazate	lb.	1.45	
Selenac	lb.	1.45	
SPDX-GH	lb.	.64	.69
Tellurac	lb.	1.45	
Tetrone	lb.	1.25	
A	lb.	1.85	
Thiocarbanilide	lb.	.34	.39
Thiofide	lb.	.35	.42
Thionex	lb.	1.10	
Thiotax	lb.	.27	.34
Thiurad	lb.	1.10	
Thiuram E	lb.	1.00	
M	lb.	1.10	
Trimene	lb.	.54	.64
Base	lb.	1.03	1.18
Triphenylguanidine(TPG)	lb.	.45	.50
Tuex	lb.	1.10	
2-MT	lb.	.58	.60
Ultex	lb.	1.00	1.05
Ureka	lb.	.55	.62
Blend "B"	lb.	.55	.62
C	lb.	.52	.59
Vulcanex	lb.	.45	
Z-B-X	lb.	2.45	
Zenite	lb.	.33	.35
A	lb.	.42	.44
B	lb.	.39	.41
Special	lb.	.34	.36

Accelerator-Activators, Inorganic

Lime hydrated	ton	9.00	12.25
Litharge, comml.	lb.	.2125	.225
Eagle, sublimed	lb.	.2225	.2235
Red lead, comml.	lb.	.2125	.2375
Eagle	lb.	.2325	
White lead, basic	lb.	.205	.215
Eagle	lb.	.205	.215
White lead silicate	lb.	$0.1725	$0.2475
Eagle	lb.	.21	.2475
Zinc oxide, comml.†	lb.	.11	.16

Accelerator-Activators, Organic

Barak	lb.	.60	
D-B-A	lb.	1.95	
Delac P	lb.	.45	.52
Emery's 0-18 Elaine	lb.	.255	.375
S 24	lb.	.34	.43
Guantal	lb.	.47	.54
Laurex	lb.	.32	.35
Lead oleate	lb.	.365	
MODX	lb.	.295	.345
Palmalene	lb.	.35	
Plastone	lb.	.27	.30
Ridacto	lb.	.22	.24
Stearex Beads	lb.	.14⅞	.15⅞
Stearic acid, single pressed	lb.	.275	.285
Double pressed	lb.	.28	.29
Triple pressed	lb.	.3075	.3125
Stearite	lb.	.14⅞	
Tonox	lb.	.50	.59
Zinc stearate	lb.	.45	.46

Alkalies

Caustic soda, flake	100 lbs.	3.45	6.90
Liquid, 50%	100 lbs.	2.40	2.50
Solid	100 lbs.	3.05	5.60

Antioxidants

AgeRite Alba	lb.	2.20	2.30
Gel	lb.	.58	.60
H.P.	lb.	.61	.63
Hipar	lb.	.82	.84
Powder	lb.	.46	.48
Resin	lb.	.63	.65
D	lb.	.46	.48
Stalite	lb.	.46	.48
White	lb.	1.40	1.50
Akrodex C	lb.	.58	.60
Albasan	lb.	.69	.74
Aminox	lb.	.46	.55
Antisol	lb.	.23	.24
Antox	lb.	.54	.56
Aranox	lb.	2.15	
Betanox Special	lb.	.68	.77
B-L-E	lb.	.46	.55
Powder	lb.	.61	.70
B-X-A	lb.	.43	.52
Copper Inhibiter X-872-L	lb.	1.75	1.85
Deen x	lb.	.95	1.05
Flectol H	lb.	.46	.53
Flexamine	lb.	.61	.70
Heliozone	lb.	.25	.26
Mekon micro-crystalline wax, amber	lb.	.14	.16
Black	lb.	.135	.155
Yellow	lb.	.155	.175
Neozone (standard)	lb.	.66	.68
A	lb.	.43	.45
C	lb.	.47	.49
D	lb.	.43	.45
Distilled	lb.	.48	.50
Parazone	lb.	.68	
Perflectol	lb.	.61	.68
Permalux	lb.	1.53	1.55
Rio Resin	lb.	.50	.52
Santoflex 35	lb.	.61	.68
B	lb.	.46	.53
Santovar-O	lb.	1.10	1.17
Santowhite Crystals	lb.	1.73	1.80
MK	lb.	1.40	1.52
MKS	lb.	1.25	1.37
S.C.R.	lb.	.32	.34
Solux	lb.	1.93	1.95
Stabilite	lb.	.48	.50
Alba	lb.	.69	.74
L	lb.	.48	.50
Sunproof	lb.	.25	.30
Improved	lb.	.25	.30
Jr.	lb.	.18	.23
Thermoflex	lb.	1.48	1.50
A	lb.	.76	.78
C	lb.	.54	.56
Tonox	lb.	.50	.59
Tysonite	lb.	.215	.2225
V-G-B	lb.	.55	.64
Zenite	lb.	.37	.39

Antiseptics

Copper naphthenate, 6-8%	lb.	.225	
G-4	lb.	.95	1.40
G-11	lb.	4.50	4.75
Pentachlorophenol	lb.	.20	.25
Resorcinol, technical	lb.	.68	
Zinc naphthenate, 8-10%	lb.	.0515	.0555

Blowing Agents

Ammonium, bicarbonate	lb.	.064	.0975
Carbonate	lb.	.11	.1225
Sodium bicarbonate	100 lbs.	1.95	2.60
Carbonate, technical	100 lbs.	1.15	4.45
Sponge Paste	lb.	.20	
Unicel	lb.	.60	
ND	lb.	1.00	

*Prices in general are f.o.b. works. Range indicates grade or quantity variations. Space limitation prevents listing of all known ingredients. Prices are not guaranteed; contact suppliers for spot prices.

†For trade names, see Color—White, Zinc Oxide.

Bonding Agents

MDI	lb.	$7.25	$7.75
50	lb.	3.60	3.85
Ty-Ply Q. S.	gal.	6.75	8.00

Brake Lining Saturants

B.R.T. No. 3	lb.	.0175	.0185
Resinex L-5	lb.	.0225	.03

Carbon Blacks

Conductive Channel—CC

Continental R-20, -40	lb.	.055	.102
Kosmos Dixie	lb.	.15	.185
Spheron C	lb.	.12	.165
I	lb.	.10	.145
N	lb.	.22	.25
Voltex	lb.	.15	.185

Easy Processing Channel—EPC

Continental AA	lb.	.055	.102
Kosmobile 77/Dixiedensed 77	lb.	.07	.1125
Micronex W-6	lb.	.07	.1125
Spheron #9	lb.	.07	.117
Witco #12	lb.	.055	.102
Wyex	lb.	.07	.115

Hard Processing Channel—HPC

Continental F	lb.	.055	.102
HX	lb.	.07	.115
Kosmobile S/Dixiedensed S	lb.	.07	.112
Micronex Mk. II	lb.	.07	.112
Spheron #4	lb.	.07	.117
Witco #6	lb.	.555	.102

Medium Processing Channel—MPC

Arrow TX	lb.	.07	.115
Continental A	lb.	.055	.102
Kosmobile S-66/Dixiedensed S-66	lb.	.07	.1125
Micronex Standard	lb.	.07	.1125
Spheron #6	lb.	.07	.117
Witco #1	lb.	.055	.102

Conductive Furnace—CF

Statex A	lb.	.08	.10
Sterling I	lb.	.09	

Fast Extruding Furnace—FEF

Statex M	lb.	.055	.095

Fine Furnace—FF

Statex B	lb.	.0575	.0975
Sterling 99	lb.	.065	.105
105	lb.	.0732	.117
Vulcan	lb.	.0732	.117

High Abrasion Furnace—HAF

Philblack O	lb.	.07	.1132

High Elongation Furnace—HEF

Sterling K	lb.	.05	.09

High Modulus Furnace—HMF

Continex HMF	lb.	.05	.075
Kosmos 40/Dixie 40	lb.	.05	.09
Kosmos 50/Dixie 50	lb.	.055	.095
Modulex	lb.	.05	.075
Philblack A	lb.	.0525	.095
Statex 93	lb.	.05	.09
Sterling L	lb.	.05	.09
SO	lb.	.055	.095

Reinforcing Furnace—RF

Kosmos 60/Dixie 60	lb.	.0732	.115

Semi-Reinforcing Furnace—SRF

Continex SRF	lb.	.035	.055
Essex	lb.	.035	.055
Furnex	lb.	.035	.075
Gastex	lb.	.035	.075
Kosmos 20/Dixie 20	lb.	.035	.075
Pelletex	lb.	.035	.075
Sterling NS, R, S	lb.	.035	.075

Very Fine Furnace—VFF

Statex K	lb.	.0732	.1125

Fine Thermal—FT

P-33	lb.	.05	

Medium Thermal—MT

Thermax	lb.	.03	
Stainless	lb.	.035	

Chemical Stabilizers

Lead stearate	lb.	.49	.57
Vanstay	lb.	.38	.40
White lead, basic	lb.	.205	.215

Colors

Black

Black Paste #25	lb.	.22	.40
BK Iron Oxides	lb.	.03	.11
Lampblack, comml.	lb.	.07	.30
Superjet	lb.	.0675	.1025
Mapico	lb.	.1075	.11
MB Mineral Blacks	lb.	.0315	.0675

Blue

Du Pont	lb.	.945	3.95
Heveatex pastes	lb.	.80	1.45

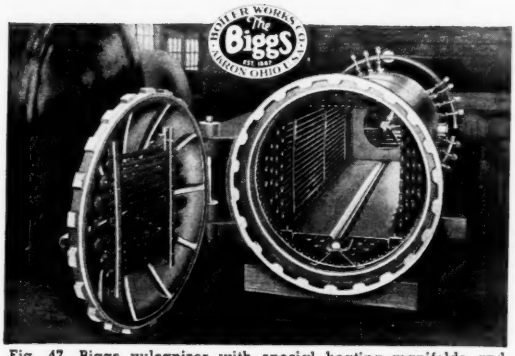

Fig. 47. Biggs vulcanizer with special heating manifolds and circulating fan; all sizes, various working pressures.

***BIGGS Vulcanizers* are Standard Equipment in the Rubber Industry**

Biggs-built vulcanizers and devulcanizers have always had a prominent place in the development of the rubber industry. For over 45 years Biggs has furnished single-shell and jacketed vulcanizers both vertical and horizontal, as well as many different types of devulcanizers. Biggs modern all-welded units with quick-opening doors are available in all sizes and for various working pressures—with many special features.

Ask for our Bulletin No. 45

THE *Biggs* BOILER WORKS CO.
1007 BANK STREET • AKRON 5, OHIO, U.S.A.

NATURAL RUBBER
LATEX
for IMMEDIATE DELIVERY

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TEAR TEST EQUIPMENT

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Fair Prices
Reliable Delivery
Good Workmanship

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Your Inquiries are Solicited

THE AKRON EQUIPMENT CO.
AKRON 9, OHIO

The Higher the Pressure ...the Tighter the Valve

On hydraulic presses of all types this Yarway Hydraulic Valve will give long life with minimum maintenance. Automatically regrinds its own sealing surfaces. Small and compact. Easy to install and operate.

Yarway Single-Pressure Hydraulic Valves are made in straightway, three-way and four-way types; in five sizes for pressures up to 5000 lbs. Also Yarway Two-Pressure Valves in two sizes for pressures up to 4000 lbs. Write for Bulletin H-209.

YARNALL-WARING CO.
103 Mermaid Ave., Philadelphia 18, Pa.

YARWAY
Improved Type
HYDRAULIC VALVE

Stan-Tone	lb.	$1.00	$1.55
Toners	lb.	.30	3.30
Brown			
Brown Paste #5, #10	lb.	.35	.45
Iron oxide, brown	lb.	.03	.12
Mapico	lb.	.125	
Metallic brown	lb.	.03	.0325
Plastics brown	lb.	.0565	.065
Sienna, burnt	lb.	.0375	.15
Raw	lb.	.04	.1275
Umber, burnt	lb.	.0475	.0675
Raw	lb.	.0375	.06
Green			
Chrome	lb.	.10 /	.4525
Oxide	lb.	.33 /	.40
Du Pont	lb.	1.10	3.20
G-4099	lb.	.325	.33
G-5299, -6099	lb.	.315	.32
G-7599	lb.	.38	.385
G-9869	lb.	.75	.90
G-9976	lb.	.85	1.00
Heveatex pastes	lb.	.95	1.85
Stan-Tone	lb.	1.50	3.30
Toners	lb.	.35	4.00
Orange			
Du Pont	lb.	2.75	3.65
Orange Paste #13	lb.	1.35	1.50
Stan-Tone	lb.	1.65	2.25
Toners	lb.	.30	1.50
Red			
Antimony trisulfide	lb.	.55	.68
R. M. P. Sulfur Free	lb.	.63	.68
R.P.M. No. 3	lb.	.55	.60
Cadmium red lithopone	lb.	1.05 /	1.45
Cadmolith R-d	lb.	1.10	1.40
Du Pont	lb.	1.15	1.90
Indian Red	lb.	.115	.1175
Iron oxide, red	lb.	.0525	.1175
Light	lb.	.115	.1175
Mapico	lb.	.115	.1175
Red Paste #17, 1-2	lb.	.95 /	1.10
Rub-Er-Red	lb.	.0975	
Stan-Tone	lb.	1.10	3.05
Toners	lb.	.25	4.15
Tuscan Red	lb.	.245	.25
Venetian Red	lb.	.035	.049
White			
Antimony oxide	lb.	.27	.35
Lithopone, titanated	lb.	.0725	.085
Cryptone BT	lb.	.0825	.085
Titanium pigments:			
Rayox LW	lb.	.18	.19
R-110	lb.	.20	.21
Ti-Cal	lb.	.0675	
Ti-Pure	lb.	.175	.195
Titanox-A, -AA	lb.	.18	.19
B-30	lb.	.075	.08
C, RC	lb.	.07	.075
RA, RA-10	lb.	.20	.21
Zopaque	lb.	.175	.185
Zinc oxide, comml.	lb.	.11	.16
Azo ZZZ-11, -44, -55	lb.	.11	.12
-66	lb.	.1325	.1425
35% leaded	lb.	.12½	.13½
Eagle AAA, lead free	lb.	.135	.1375
35% leaded	lb.	.15½	.15¾
50% leaded	lb.	.15¾	.16⅛
Florence Green Seal-8	lb.	.1525	.155
Red Seal-9	lb.	.1475	.15
White Seal-7	lb.	.1575	.16
Horsehead XX-4, -78	lb.	.135	.1375
Kadox-15, -17, -72	lb.	.135	.1375
-25	lb.	.1575 /	.16
Protox-166	lb.	.095	.0975
St. Joe, lead free	lb.	.11	.12
Zinc sulfide, comml.	lb.	.08	.1175
Cryptone ZS-800	lb.	.135	.1375
Yellow			
Cadmium yellow lithopone	lb.	.85 /	.90
Cadmolith Yellow	lb.	.85 /	.90
Chrome	lb.	.295	.315
Du Pont	lb.	1.35	1.95
Iron oxide, yellow	lb.	.01⅛	.0925
Mapico	lb.	.09	.0925
Ocher, yellow	lb.	.0125	.025
Stan-Tone	lb.	1.00	1.55
Toners	lb.	.50	1.37
Yellow D	lb.	1.25 /	1.35
Dispersing Agents			
Darvan Nos. 1, 2	lb.	.19 /	.30
Stan-Chem	lb.	.1225 /	.2587
Triton R-100	lb.	.12 /	.25
Dusting Agents			
Glycerized Liquid Lubricant, concentrated	gal.	1.85	
Lubrex	lb.	.25 /	.30
Mica	lb.	.0675 /	.075
Pyrax A	ton	12.50	
W. A.	ton	14.50	
Snow Crest Talc	ton	33.00 /	35.00
Vanfre	gal.	2.00 /	2.50
Zinc stearate	lb.	.45 /	.46
Extenders			
Advagum 1098	lb.	.42	
1198	lb.	.40	
B. R. S. 700	lb.	.0175 /	.026
B. R. T. No. 7	lb.	.0265 /	.0275
Califlux 510, 550	lb.	.025 /	.0325
G. P.	lb.	.0125 /	.02
Dielex B	lb.	.06	
Factice, Amberex	lb.	$0.337 /	$0.416
Brown	lb.	.153 /	.3335
Neophax	lb.	.19 /	.356
White	lb.	.144 /	.351
Mineral Rubbers			
Black Diamond	ton	25.00 /	30.00
Extender 600	lb.	.18	
Hard Hydrocarb-n	ton	42.00 /	44.00
No. 38	ton	25.00	
Parmr	ton	21.00 /	29.00
Nuba No. 1, 2	lb.	.04	
No. 3X	lb.	.065	
Rubber substitute, brown	lb.	.18 /	.317
White	lb.	.16 /	.33
Synthetic 100	lb.	.41	
Vinsol Resin	lb.	.025 /	.035
Vistanex	lb.	.32 /	.36
Fillers, Inert			
Asbestos fiber	ton	25.50 /	76.50
Barytes, floated, white	ton	33.30 /	46.25
Off-color, domestic	ton	19.00 /	20.00
No. 1	ton	33.35 /	47.75
2	ton	31.35	
Blanc fixe	ton	75.00 /	120.00
Clays:			
Champion	ton	13.03	
Crown	ton	11.00 /	23.00
Paragon	ton	12.50 /	29.00
McNamee	ton	12.50	
Stan-Tex White	ton	25.00	
Stellar-R	ton	50.00	
Suprex	ton	13.00 /	29.50
W-1291 English	ton	53.00 /	55.00
Cryptone BA, CB, MS	lb.	.08 /	.0825
Flocks:			
Cotton, dark	lb.	.095 /	.112
Dyed	lb.	.45 /	.85
White	lb.	.12 /	.20
Fabrifil X-24-G	lb.	.095	
X-24-W	lb.	.135	
Filfloc 6000	lb.	.16	
F-40-900	lb.	.105	
Kalite	ton	40.00	
Lead sulfate, basic	lb.	.1575 /	.1675
Lithopone, comml.	lb.	.06¾ /	.0675
Albalith	lb.	.06¾ /	.06¾
Astrolith	lb.	.06¾ /	.0675
Eagle	lb.	.0725 /	.075
Sunolith	lb.	.06¾ /	.0675
Mica	lb.	.0675 /	.075
No. 1 Silica	ton	40.00	
Pyrax A	ton	12.50	
W. A.	ton	14.00	
Silical	ton	7.00 /	55.00
SL Slate Flour	ton	17.00 /	27.00
Suspenso	ton	22.00	
Swansdown	ton	20.00	
Terra Alba 1319	ton	27.00	
Ti-Cal	lb.	.0675	
Titanox-C, RCHT	lb.	.07 /	.075
Whiting, limestone	ton	10.00 /	27.50
Paxinosa	ton	9.50 /	16.50
Witco	ton	6.50	
Finishes			
Black-Out	gal.	4.50 /	8.00
Flocks			
Cotton, dark	lb.	.095 /	.112
Dyed	lb.	.45 /	.85
White	lb.	.12 /	.20
Rayon, colored	lb.	.90 /	1.50
White	lb.	.75 /	1.25
Rubber lacquer, clear	gal.	1.00 /	2.00
Colored	gal.	2.00 /	3.50
Shoe varnish	gal.	1.45	
Talc	ton	14.00 /	32.00
Wax, Bees	lb.	.60 /	.73
Carnauba	lb.	.82 /	1.23
Montan	lb.	.45 /	.47
No. 118, colors	gal.	.86 /	1.41
Neutral	gal.	.76 /	1.31
Van Wax	gal.	1.25 /	1.30
Latex Compounding Ingredients			
#6, #7, #8	lb.	.55 /	.60
A-2, -155	lb.	.15 /	.18
A-40, -41	lb.	.165 /	.195
A-155 TH	lb.	.16 /	.19
Accelerator 89	lb.	1.20	
122	lb.	1.30	
Advawet 10	lb.	.46	
Aerosol	lb.	.35	
AgeRite Dispersions	lb.	.60 /	2.25
Amberex Solutions	lb.	.1675 /	.18
Antox, dispersed	lb.	.54	
Aquarex BBX, Conc.	lb.	.78	
D	lb.	.76	
MDL Paste	lb.	.30	
ME	lb.	.92	
NS	lb.	.60	
SMO	lb.	.50	
Areskap 50	lb.	.30 /	.38
100, dry	lb.	.60 /	.72
Aresket 240	lb.	.30 /	.38
300, dry	lb.	.60 /	.72
Aresklene 375	lb.	.42 /	.57
400, dry	lb.	.70 /	.84
Black No. 25, dispersed	lb.	.22	
Casein	lb.	.275 /	.37
CW-12	lb.	.85	
CW-37	lb.	.70	
Darex Copolymers Nos. 3-L, 9-L, X34-L, X44-L	lb.	.365 /	.50
Dispersed Sulfur No. 2	lb.	.10 /	.12
Ethyl Thiurad	lb.	1.00	
Factice dispersions	lb.	.1675	.49
Laton L	lb.	.075 /	.0775
Marmix	lb.	.36 /	.43
Micronex, colloidal		$0.06 /	$0.07
NA-11	lb.	.65 /	
P-242	lb.	.25 /	.35
P-253	lb.	.15 /	.18
P-370	lb.	.145 /	.175
P-398	lb.	2.40	
pHR Latex Chemical	lb.	2.00	
Pip-Pip	lb.	1.63	
R-2 Crystals	lb.	1.55	
Resin V	lb.	.13	
Santomerse D	lb.	.43 /	.65
S	lb.	.12 /	.25
Setsit No. 5	lb.	.75 /	1.00
Stablex G	lb.	.60 /	.70
L	lb.	.30 /	.40
T	gal.	.95	
Sulfur Dispersion, 50%	lb.	.07 /	.15
66⅔%	lb.	.09 /	.17
Tepidone	lb.	.55	
Tergitol wetting agents	lb.	.265 /	.37
Zinc oxide, dispersed	lb.	.13 /	.20
Mold Lubricants			
Aluminum stearate, precip.	lb.	.41 /	.48
Aquarex D	lb.	.75	
MDL Paste	lb.	.32	
Carbowax compounds	lbs.	.24 /	.35
Colite Concentrate	gal.	.90 /	1.15
DC Mold Release Fluid	lb.	5.20 /	6.00
Emulsion No. 35	lb.	2.20 /	3.50
Glycerized Liquid Lubricant, concentrated	gal.	1.85	
Lubrex	lb.	.25 /	.30
Mica	lb.	.0675 /	.075
Mold Paste	lb.	.18	
Montan Wax	lb.	.57	
Para Lube	lb.	.046 /	.048
Rubber-Glo	gal.	.97	
Sodium stearate	lb.	.19 /	.24
Talc	ton	14.00 /	32.00
Odorants			
Coumarin	lb.	3.00 /	3.15
Curodex 19	lb.	4.75	
188	lb.	5.75	
198	lb.	6.75	
Para-Dor A	lb.	2.00 /	2.50
C	lb.	2.75 /	3.25
E	lb.	.25 /	.55
Rodo No. 0	lb.	4.00 /	4.50
No. 10	lb.	5.00 /	5.50
Vanillin	lb.	3.00 /	4.65
Plasticizers and Softeners			
Akroflex C	lb.	.53 /	.55
Barak	lb.	.60	
Bardex	lb.	.05 /	.0525
Bardol	lb.	.0275 /	.0375
B	lb.	.055 /	.0575
Barium stearate	lb.	.45 /	.46
Bondogen	lb.	.55 /	.60
B. R. C. Nos. 18, 19E, 20, 22	lb.	.0125 /	.0135
B. R. H. No. 2	lb.	.02 /	.029
B. R. S. 700	lb.	.0175 /	.026
B. R. T. No. 4	lb.	.0265 /	.0275
B. R. V.	lb.	.0325 /	.049
Bunarax resins	lb.	.06 /	.125
Bunnatol G. S.	lb.	.40 /	.50
Butac	lb.	.11 /	.12
Butyl Roleate	lb.	.16 /	.195
Calcium stearate	lb.	.42 /	.44
Califlux 510, 550	lb.	.025 /	.0325
G. P.	lb.	.0125 /	.02
R-100	lb.	.05 /	.0575
Carbonex Flakes	lb.	.0325 /	.0375
S Flakes	lb.	.0475 /	.0525
Plastic	lb.	.046 /	.051
Contogums	lb.	.0875 /	.11
Cumar EX	lb.	.0525	
MH	lb.	.065 /	.1175
V	lb.	.0975 /	.1275
Dibenzyl phthalate	lb.	.51 /	.59
Sebacate	lb.	.67 /	.74
Dibutyl phthalate	lb.	.355 /	.385
Sebacate	lb.	.67 /	.69
Dicapryl phthalate	lb.	.25 /	.30
Dielex B	lb.	.06	
Diethyl phthalate	lb.	.32 /	.34
Dimethyl phthalate	lb.	.26 /	.28
Dipentene 122	gal.	.60 /	.75
Dipolymer Oil	gal.	.33 /	.38
Dispersing Oil No. 10	lb.	.0525 /	.055
Duraplex C-50 LV, 100%	lb.	.25 /	.295
Dutrex 6	lb.	.025 /	.0375
Emery's 0-18 Elaine	lb.	.255 /	.3275
S-24	lb.	.34 /	.43
Flexol Plasticizer 3GH	lb.	.55 /	.60
3GO	lb.	.515 /	.60
4GO	lb.	.36 /	.38
8N8	lb.	.395 /	.465
DOP	lb.	.379 /	.424
R-1	lb.	.47 /	.475
TOF	lb.	.45 /	.52
TWS	lb.	.405 /	.425
Galex W-100	lb.	.135 /	.1725
W-100D	lb.	.1325 /	.17
G. B. Light Process Oil	lb.	.025 /	.0325
Heavy Resin Oil	lb.	.015 /	.0225
Hercolyn	lb.	.1122 /	.1347
Indonex	gal.	.12 /	.17
IMH	lb.	.65 /	.68
Lead oleate	lb.	.365	
Magnesium stearate	lb.	.46 /	.47
Nevillac oils	lb.	.33 /	.45
Resins	lb.	.31 /	.45
Neville 465 Resin	lb.	.0575	
R Resins	lb.	.10 /	.155
Nevinol	lb.	.17	

New Design

LABORATORY MILLS

Thropp presents four newly designed laboratory mills. Some of these feature self-aligning roller bearings on the rolls, and non-leaking oil seals to prevent contamination of stock. Their use permits high temperatures for plastics. The new mills are available in a wide price and capacity range.

also . . . Thropp Laboratory Calenders

West Coast Representative
H. M. Royal, Inc.
Los Angeles, Cal.

Export Agent . . . **Steinhardter & Nordlinger, 105 Hudson St., New York, N. Y.**

THROPP

WM. R. THROPP & SONS CO. Trenton, N. J.

EAGLE-PICHER

pigments for the rubber industry

- Red Lead (95%:97%:98%)
- Sublimed Litharge
- Litharge
- Basic Carbonate of White Lead
- Sublimed White Lead
- Basic White Lead Silicate
- Sublimed Blue Lead
- Zinc Pigments

59 plants located in 27 states give Eagle-Picher's activities a national scope. Strategic location of plants and extensive production facilities enable Eagle-Picher to serve industry with increased efficiency... we manufacture a comprehensive line of both lead and zinc pigments for the rubber, paint and other process industries.

THE EAGLE-PICHER COMPANY

EAGLE EP PICHER Since 1843

General Offices: Cincinnati (1), Ohio

REVERTEX
60% LATEX
NORMAL LATEX

NATURAL LATEX COMPOUNDS

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We maintain a fully equipped laboratory and free consulting service.

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RUBBER CORPORATION OF AMERICA

Formerly Revertex Corporation of America

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Montreal 1, Canada

Charles Larkin, II
250 Delaware Avenue
Buffalo 2, N. Y.

"It's a miracle worker!"

That's what one pleased rubber factory operator says concerning the

ATLAS Type "E"
High Pressure Reducing Valve

Of course we have never claimed that this remarkable valve really performs miracles. But it *does* do things that some Doubting Thomases have called "impossible"—such as reducing pressures as high as 6,000 lb. per sq. in. *without shock.* All of which explains why it is now used in all of the leading rubber plants, handling water, oil, or air with equal ease.

Why Is It So Popular?

It is popular because it is *dependable.* And it is dependable because it is so well made—by a concern that has been building regulating valves for every service for nearly a half century—*exclusively.* The body of Type "E", for example, is of forged steel. All internal metal parts are wholly of stainless steel. A formed packing of special material superior to leather is used which is immune to all fluids commonly used in hydraulic machinery. The pressure on the seat is balanced by a piston with the result that variations in high initial pressure have little effect on the reduced pressure. Ask for complete information.

For other ATLAS rubber plant products see the partial list in our ad in the January, 1948, issue of INDIA RUBBER WORLD

ATLAS VALVE COMPANY

REGULATING VALVES FOR EVERY SERVICE

261 South Street, Newark 5, N. J.

Represented in principal Cities

Nevoil	lb.	$0.02	$0.025
Nevtex 10	lb.	.0775	.08
90	lb.	.20	
No. 1-D heavy oil	lb.	.055	
Palmalene	lb.	.15	
Para Flux, regular	gal.	.1825	.2025
No. 2016	gal.	.22	.24
Para Resins 2457, 2718	lb.	.04	.045
Paradene Nos. 1, 2	lb.	.055	
33, 34	lb.	.07	
No. 35	lb.	.075	
Para Lube	lb.	.046	.048
Paraplex, A1-111	lb.	.21	.25
G-25, 100	lb.	.75	
Parolls	lb.	.0975	.18
Pepton 22	lb.	.72	.75
Picco-10, -25	lb.	.12	.17
-75, -100	lb.	.115	.17
480 Oilproof resin	lb.	.15	.20
S. O. S.	gal.	.29 /	.34
Piccocizer 30	lb.	.055 /	.06
Piccolastic Resins	lb.	.139	.275
Piccolyte Resins	lb.	.15	.2075
Piccoumaron Resin 427-R	lb.	.12	.17
Resins	lb.	.06	.17
Piccovars	lb.	.0975 /	.1675
Piccovol	lb.	.025	.04
Pictar	gal.	.25 /	.30
Plasticizer 35	lb.	.205	.24
36	lb.	.305	.34
42	lb.	.34	.40
1889	lb.	.77	
1919	lb.	.68	
B	lb.	.35	.45
SC	lb.	.50	.57
Plastoflex No. 10	lb.	.20	
No. 20	lb.	.25	
Plastogen	lb.	.0775	.08
Plastone	lb.	.27 /	.30
PS-60 Resin	lb.	.35	
PT67 Light Pine Oil	gal.	.60 /	.70
101 Comml. Pine Tar Oil	gal.	.345 /	.455
400 Light Pine Tar	gal.	.345 /	.455
600 Med. Pine Tar	gal.	.345 /	.455
800 Heavy Pine Tar	gal.	.345 /	.455
R-19, R-21 Resins	lb.	.1075	
Reogen	lb.	.1175	.12
Resin C pitch	lb.	.02 /	.0285
R6-3	lb.	.38	.40
Resinex	lb.	.0325 /	.0375
L-4	lb.	.0225 /	.03
RPA No. 2	lb.	.65	
No. 3	lb.	.46	
5	lb.	.57	
RSN Flux	gal.	.10 /	.19
Rubberol Compound	lb.	.315	
S-Polymers	lb.	.44	
Santicizer B-16	lb.	.52 /	.57
E-15	lb.	.49 /	.54
M-17	lb.	.46 /	.51
No. 140	lb.	.3225 /	.38
Sebacic acid	lb.	.68 /	.72
Solvenol	gal.	.56 /	.58
Staybelite Resin	lb.	.06 /	.065
Stearex Beads	lb.	.14¾ /	.15⅞
Stearic acid, single pressed	lb.	.275 /	.285
Double pressed	lb.	.28	.29
Triple pressed	lb.	.3075	.3125
Stearite	lb.	.14¾	
Synthol	lb.	.255	
"Thiokol" LP-3	lb.	.85	
TP-90B	lb.	.65	
-95	lb.	.55	
-98	lb.	.50	
TR-11	lb.	.035	
Tricresyl phosphate	lb.	.365 /	.47
Turgum S	lb.	.095 /	.105
Tysonite	lb.	.215 /	.2225
Vistac No. 1	gal.	1.21	1.32
2	gal.	1.62 /	1.66
4	gal.	1.76 /	1.80
X-1 Resinous Oil	lb.	.025	
XX-100 Resin	lb.	.0525	
Zinc laurate	lb.	.45 /	.46

Reclaiming Oils

Bardex	lb.	.05 /	.0525
Bardol	lb.	.0275 /	.0375
B	lb.	.055 /	.0575
B. R. H No. 2	lb.	.02 /	.029
B. R. T. No. 3	lb.	.024 /	.025
No. 4	lb.	.013 /	.0235
B. R. V	lb.	.0325 /	.049
BWH-1	lb.	.14	
Dipentene 122	gal.	.60 /	.75
Dipolymer Oil	gal.	.33 /	.38
Dispersing Oil No. 10	lb.	.0525 /	.055
G. B. Reclaiming Oil	gal.	.12 /	.18
Heavy Resin Oil	lb.	.0225 /	.0325
LX-83	gal.	.15 /	.23
-572	gal.	.20 /	.28
No. 1 Heavy Oil	lb.	.055	
No. 1621	lb.	.025 /	.035
Picco C-10	gal.	.25 /	.30
C-28	gal.	.33 /	.38
C-33	gal.	.20 /	.25
C-42	gal.	.27 /	.32
D-4	gal.	.23 /	.28
E-5	gal.	.21 /	.26
Q Oil	gal.	.246 /	.296
PT 101 Comml. Pine Tar Oil	gal.	.345 /	.455
150 Solventene	gal.	.44 /	.55
Solvenol	gal.	.56 /	.58
S. R. O.	lb.	.015 /	.0225
Wilcor Nos. 111, 151	gal.	.26 /	.30
X-50 Solvent	gal.	.24 /	.32
X-443	gal.	.20 /	.27

Reinforcers, Other Than Carbon Black

B. R. C. Nos. 18, 19E, 20, 22	lb.	$0.0125	$0.0135
Bunarex resins	lb.	.06	.125
Calcene T	ton	40.00 /	50.00
Calco S. A.	lb.	.75	
Carbonex, flakes	lb.	.0325	.0375
S Flakes	lb.	.0475	.0525
Plastic	lb.	.046	.051
Clays			
Aluminum Flake	ton	16.00 /	22.00
No. 5	ton	20.00	
Barden	ton	12.00	
Buca	ton	40.00	
Catalpo	ton	30.00	
China	ton	9.50 /	16.00
Dixie	ton	13.00	
Hydratex R	ton	28.00	
L. G. B.	ton	17.00	
Paragon R	ton	12.50 /	29.00
Pigment No. 33	ton	30.00	
Suprex	ton	13.00 /	29.50
Witco Nos. 1, 2	ton	25.00	
Cumar EX	lb.	.0525	
MH	lb.	.065	.1175
V	lb.	.0975	.1275
Darex Copolymer Nos. 3, X-34	lb.	.35 /	.37
No. X-43	lb.	.36 /	.38
G Resin	lb.	.08	
Good-Rite Resin 50	lb.	.415 /	.455
Magnesia, Calcined			
Extra Light, U.S.P.	lb.	.31 /	.33
K&M	lb.	.08 /	.125
Light, technical	lb.	.28	
No. 101	lb.	.175	
Heavy, technical	lb.	.05 /	.1275
Medium light, technical	lb.	.12	
Magnesium carbonate	lb.	.08 /	.115
Marbon S, S-1	lb.	.36 /	.43
Type B	lb.	.65 /	.75
Millical	ton	25.00	
Multifex	ton	105.00	
Neville R Resins	lb.	.10 /	.155
Para Resins 2457, 2718	lb.	.04 /	.045
Picco-75, -100	lb.	.115 /	.17
Piccolastic Resins	lb.	.139 /	.275
Piccolyte Resins	lb.	.15 /	.2075
Piccoumaron Resins	lb.	.06 /	.17
Piccovars	lb.	.0975 /	.1675
Pliolite, Natural Rubber	lb.	.75 /	.82
Milled	lb.	.85 /	.92
S-2, Milled	lb.	.74 /	.81
S-3, -6	lb.	.36 /	.43
S-6 Masterbatches	lb.	.35 /	.50
PS-60 Resin	lb.	.35	
Resin C Pitch	lb.	.02 /	.0285
Resinex	lb.	.0325 /	.0375
S-Polymers	lb.	.44	
Silene EF	lb.	.055 /	.06
Super Multifex	ton	145.00	
Witcarb R	ton	100.00	
R-12	ton	32.50	
Zinc oxide, commercial†	lb.	.11 /	.16

Retarders

Cumar RH	lb.	.105	
Delac J	lb.	.55 /	.60
E-S-E-N	lb.	.36 /	.41
Good-Rite Vultrol	lb.	.55 /	.57
M-B-T	lb.	.27 /	.33
M-B-T-S	lb.	.35 /	.41
R-17 Resin	lb.	.1075	
Retarder PD	lb.	.36	
W	lb.	.43	
Retardex	lb.	.475	
RM	lb.	1.25	
Thionex	lb.	1.25	
Thiuram E, M	lb.	1.25	
Vultrol	lb.	.50 /	.55

Solvents

Benzol, industrial	gal.	.20 /	.21
Bondogen	lb.	.55 /	.60
Carbon bisulfide	lb.	.0575 /	.0875
Tetrachloride	lb.	.075 /	.08
Cosol No. 1	gal.	.30 /	.38
No. 2	gal.	.30 /	.38
GVL	lb.	1.00	
Nevsol	gal.	.185 /	.25
Picco Hi-Solv Solvents	gal.	.21 /	.26
Skellysolve-B	gal.	.141	
C	gal.	.133	
R	gal.	.109	
Tollac	gal.	.195 /	.25
Toluol, industrial	gal.	.23 /	.29
2-50-W Hi-Flash Solvent	gal.	.37	
X-60 Solvent	gal.	.24 /	.32
Xylol, industrial	gal.	.235 /	.30

Synthetic Resins

Marvinol VR-10	lb.	.33 /	.50

Synthetic Rubbers and Latices

Butaprene NAA	lb.	.44 /	.465
NF	lb.	.39 /	.415
NL	lb.	.40 /	.425
NXM	lb.	.47 /	.495
Butaprene Latex (dry wt.) NI, NXM	lb.	.455 /	.49
Chemigum N-1	lb.	.53 /	.60
Chemigum Latex Type 101 (dry wt.)	lb.	.37 /	.40
Hycar OR-15	lb.	.455 /	.53
-25, -25 EP, OS-10	lb.	.40 /	.435
-25 NS	lb.	.42 /	.455
Hycar Latex (dry wt.) 1501, 1531, 1551	lb.	$0.48 /	$0.53
1502, 1552, 1562	lb.	.41 /	.46
1532	lb.	.425 /	.475
Neoprene Latex (dry wt.) Type 571, 842, 842-A	lb.	.29 /	.37
572, 700	lb.	.30 /	.38
601, 601-A	lb.	.32 /	.40
Neoprene Type AC, CG	lb.	.50	
E, M	lb.	.65	
FR, KNR	lb.	.75	
NC	lb.	.35	
Paraplex X-100	lb.	1.00	
Perbunan 18	lb.	.39 /	.425
26	lb.	.40 /	.435
35	lb.	.47 /	.505
Perbunan Latex Type H (55°c)	lb.	.38 /	.42
Silastic No. 121	lb.	2.35 /	2.75
122	lb.	3.20 /	3.60
123	lb.	3.60 /	4.00
125	lb.	3.80 /	4.40
126	lb.	4.00 /	4.40
150, 180	lb.	3.35 /	3.95
160, 167	lb.	2.90 /	3.50
181	lb.	3.55 /	4.15
"Thiokol" Latex (dry wt.) MF	lb.	.70	
MX	lb.	.50	
WD-2	lb.	.75	
"Thiokol" LP-2	lb.	.85	
PR-1	lb.	.75	
Type A	lb.	.37	
FA	lb.	.52	
ST	lb.	.75	

Tackifiers

Bunarex-10, 25, -40	lb.	.07 /	.125
Contogums	lb.	.0875 /	.11
Galex W-100	lb.	.135 /	.1725
W-100 D	lb.	.1325 /	.17
Hercolyn	lb.	.1122 /	.1347
Natac	lb.	.105 /	.115
Nevillac	lb.	.23 /	.25
Nevilloid C-55	lb.	.12	
Nevindene	lb.	.125 /	.155
Picco-10, -25	lb.	.12 /	.17
Piccolastic Tackifiers	lb.	.139 /	.275
Piccolyte Resins	lb.	.15 /	.2075
Piccoumaron Resin 427-R	lb.	.12 /	.17
Resins	lb.	.06 /	.17
Staybelite Resin	lb.	.06 /	.065
Synthetic 100	lb.	.41	
Synthol	lb.	.255	
Vistac No. 1	gal.	1.21 /	1.32
No. 2	gal.	1.62 /	1.66
4	gal.	1.76 /	1.80
Vistanex	lb.	.32 /	.36

Vulcanizing Agents

Dibenzo G-M-F	lb.	2.65	
Ethyl Tuads	lb.	1.00	
G-M-F	lb.	2.50	
Litharge, commercial	lb.	.2125 /	.225
Eagle, sublimed	lb.	.2225 /	.2235
Magnesia, Calcined Carey	lb.	.28 /	
Extra-light, U.S.P.	lb.	.31 /	.33
Heavy, technical	lb.	.05 /	.31
K&M Neoprene Grade	lb.	.28	
Light, technical	lb.	.22 /	.28
No. 101	lb.	.175	
Medium-light, technical	lb.	.175	
Methyl Selenac	lb.	1.60	
Tuads	lb.	1.10	
Red lead, commercial	lb.	.2125 /	.2375
Eagle	lb.	.2325	
Sulfur flour, comml.	100 lbs.	1.90 /	2.85
Crystex	lb.	.195 /	.23
Dichloride	lb.	.0325 /	.0825
Insoluble 60	lb.	.13 /	.135
Monochloride	lb.	.0325 /	.0825
Rubbermakers	100 lbs.	1.50 /	4.75
Tellov	lb.	2.00	
"Thiokol" CA-10	lb.	1.50	
Vandex	lb.	2.00	
Vultac Nos. 1, 2	lb.	.38 /	.45
No. 3	lb.	.42 /	.49
White lead silicate	lb.	.1725 /	.2475
Eagle	lb.	.21 /	.2475

United States Motor Vehicle Factory Sales

(Number of Vehicles)

1946	Passenger Cars	Motor Trucks	Motor Coaches	Total
First half	640,624	333,874	3,770	978,268
1947				
First half	1,721,391	618,318	9,128	2,348,837
1948	305,081	99,200	1,370	405,651
Feb.	274,847	107,054	1,090	382,991
Mar.	349,998	140,605	1,409	492,013
Apr.	308,071	128,963	1,048	438,082
May	225,461	111,789	1,281	338,531
June	312,406	117,572	1,055	431,033
First half	1,775,864	705,184	7,253	2,488,301

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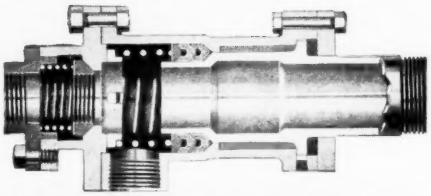

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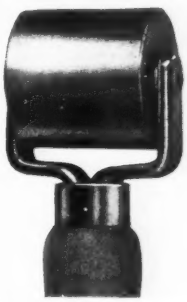

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AND TRADING COMPANY

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WOrth 4-1460

Estimated Automotive Pneumatic Casings and Tube Shipments, Production, Inventory—June-May, 1948—First Half 1948, 1947

	1948 June	% of Change from Preceding Month	1948 May	1948 First Six Months	1947 First Six Months
Passenger Casings					
Shipments					
Original equipment	1,724,546		1,372,975	10,165,876	9,685,042
Replacement	4,713,077		3,698,167	20,242,814	25,795,070
Export	43,304		38,502	342,664	843,834
Total	6,480,927	−26.84	5,109,644	30,751,354	36,323,946
Production	6,297,996	−10.11	5,719,740	34,604,720	39,630,113
Inventory end of month	9,323,461	− 1.32	9,448,439	9,323,461	4,834,015
Truck and Bus Casings					
Shipments					
Original equipment	464,035		445,251	2,820,956	2,862,080
Replacement	760,959		602,726	3,666,819	4,800,220
Export	120,764		96,794	608,553	846,547
Total	1,345,758	−17.56	1,144,771	7,096,328	8,508,856
Production	1,286,309	+ 6.21	1,211,053	7,650,381	9,390,474
Inventory end of month	2,111,699	− 2.36	2,162,669	2,111,699	1,510,517
Total Automotive Casings					
Shipments					
Original equipment	2,188,581		1,818,226	12,986,832	12,547,131
Replacement	5,474,036		4,300,893	23,909,633	30,595,290
Export	164,068		135,296	951,217	1,690,381
Total	7,826,685	−25.14	6,254,415	37,847,682	44,832,802
Production	7,584,305	− 9.43	6,930,793	42,255,101	49,020,587
Inventory end of month	11,435,160	− 1.52	11,611,108	11,435,160	6,344,532
Passenger and Truck and Bus Tubes					
Shipments					
Original equipment	2,217,332		1,813,707	13,003,520	12,543,481
Replacement	4,421,266		3,516,392	19,061,330	22,956,825
Export	106,688		89,095	561,632	1,525,157
Total	6,745,486	−21.47	5,419,194	32,626,482	37,025,463
Production	6,716,400	−17.79	5,701,812	34,749,858	42,766,855
Inventory end of month	9,938,986	− 1.29	10,068,828	9,938,986	9,252,463

NOTE: Cumulative data on this report include adjustments made in prior months.
SOURCE: The Rubber Manufacturers Association, Inc.

United States Rubber Statistics — May, 1948

All Figures in Long Tons, Dry Weight

	New Supply			Distribution		Month End Stocks
	Production	Imports	Total	Consumption	Exports	
Natural rubber, total	0	37,267	37,267	50,206	1,031	103,000
Latex, total	0	3,442	3,442	1,816	0	9,724
Rubber and latex, total	0	40,709	40,709	52,022	1,031	112,724
Synthetic rubber, total	*41,623	0	42,866	35,268	367	85,766
	†1,243					
GR-S	*35,469	0	35,626	27,631	112	265,154
	†157					
Butyl	*3,727	0	3,727	4,622	0	12,561
Neoprene	*2,427	0	2,949	2,466	213	5,809
	†522					
Nitrile	†564	0	564	549	42	2,245
Natural rubber and latex, and synthetic rubber, total	42,866	40,709	83,575	87,290	1,398	198,490
Reclaimed rubber total	21,043	0	21,043	21,975	948	36,612
GRAND TOTALS	63,909	40,709	104,618	109,265	2,345	235,102

*Government plant production.
†Private plant production.
‡Includes 32 tons shipped for export, but not cleared.
SOURCE: Rubber Division, ODC, United States Department of Commerce, Washington, D. C.

Rims Approved and Branded by The Tire & Rim Association, Inc.

RIM SIZE	July, 1948
15° & 16° D.C. Passenger	
16x4.00E	144,531
15x4.50E	13,147
16x4.50E	228,881
15x5.00E	118,191
15x5.00F	84,8359
16x5.00F	39,24
15x5.50F	59,206
16x5.50F	21,591
16x4.00E—Hump	7,601
16x4.50E—Hump	24,574
15x4½-K	37,258
16x4½-K	64,957
15x5-K	438,434
16x5-K	117,565
15x5½-K	112,887
16x5½-K	9,278
15x6-L	97,295
16x6-L	27,955
15x6½-L	55,987
15x4½-K—Hump	202,252
15x5-K—Hump	133,800
15x5½-K—Hump	117,690
15x6-L—Hump	16,070
15x6½-L—Hump	2,040
17° & Over	
17x5.15B	6,421
Flat Base Truck	
17x4.33R	3,036
20x4.33R	2,716
17x5.0	31,376
18x5.0	468
20x5.0	16,803
15x5.00S	2,324
20x5.00S	3,714
24x5.00S	511
17x5.5	21,147
15x5.50S	2,872
20x5.50S	6,909
20x6.0	192,676
24x6.0	222
20x6.00S	108,522
15x6.00T	153
20x6.00T	14,376
24x6.00T	666
20x6.5	1,293
15x6.50T	3,983
20x6.50T	27,944
20x7.0	14,955
20x7.33V	3,830
15x7.5	395
20x7.5	14,929
22x7.5	9,847
24x7.5	1,845
20x8.00V	2,524
19x8.37V	948
20x10.0	390
20x10.00W	686
Semi D. C. Truck	
13x5.50F	2,834
15x5.50F	36,377
16x5.50F	51,005
Tractor & Implement	
12x2.50C	13,794
12x3.00D	36,352
15x3.00D	35,423
16x3.00D	17,355
18x3.00D	1,645
19x3.00D	16,732
21x3.00D	2,300
24x3.00D	485
30x3.00D	354
36x3.00D	2,887
20x4.50R	7,796
24x5.50R	2,331
18x5.50F	6,053
20x5.50F	2,076
24x6.00S	880
24x8.00T	2,457
28x8.00T	628
32x8.00T	1,555
36x8.00T	989
W5-30	3,656
W6-36	1,114
W7-24	8,791
W7-28	483
W7-32	1,494
W8-24	6,812
W8-24 (H)	7,266
W8-32	1,186
W9-24	651
W9-28	12,481
W9-38	9,575
W10-28	1,100
W10-38	1,993
W14-28	682
DW8-42	1,052
DW9-38	7,963
DW10-38	7,825
DW10-42	889
DW11-28	1,911
DW11-38	5,137
DW14-28	867
DW14-30	1,228
DW14-32	311
DW18-26	152
Earth Mover	
20x11.25	189
24x11.25	66
24x13.00	330
32x13.00	4
24x15.00	12
25x15.00	47
25x17.00	136
29x17.00	282
TOTAL BRANDED RIMS	2,919,082

Trade Marks

(Continued from page 842)

439,630. **Chemiseal.** Gaskets. United States Gasket Co., Camden, N. J.

439,634. **Sunoco.** Tire gages. Sun Oil Co., Philadelphia, Pa.

439,637. Representation of a circle containing the letters: **"RCA."** Rubber parts for television, radio, etc. Radio Corp. of America, New York, N. Y.

439,639. **Grizzly Saftibond.** Brake lining. Grizzly Mfg. Co., Paulding, O.

439,654. **Modell's.** Radio sets and parts, cables and wires, etc. E. Modell, New York, N. Y.

439,681. **Koroseal.** Mechanical rubber goods. B. F. Goodrich Co., New York, N. Y.

439,705. Representation of a pennant containing the word: **"Westpoint."** Tires, tubes, belts, etc. Oakes & Co., Chicago, Ill.

439,713. **Prox-Peel.** Coating compositions. Pyroxylin Products, Inc., Chicago, Ill.

439,724. **Sunoco.** Tires, tubes, belts, etc. Sun Oil Co., Philadelphia, Pa.

439,761. **Cartex.** Latex adhesive. Carter's Ink Co., Cambridge, Mass.

439,765. **Koroseal.** Raincoats, aprons, boots, etc. B. F. Goodrich Co., Akron, O.

439,776. Representation of a fanciful design and the words: **"George-Wally."** Haberdashery including suspenders and garters. George-Wally, New York, N. Y.

439,783. **Reliance.** Rubber gloves. Faultless Rubber Co., doing business as Ashland Rubber Works, Ashland, O.

439,788. **Trixiann.** Corsets, girdles, and brassieres. Berger Bros. Co., New Haven, Conn.

439,789. **Trixilee.** Corsets, girdles, and brassieres. Berger Bros. Co., New Haven, Conn.

439,792. **Galetone.** Raincoats. Alligator Co., St. Louis, Mo.

439,798. Representation of a black spot containing in white the word: **"Kabo."** Foundation garments. Kabo Corset Co., Chicago, Ill.

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United States Imports, Exports, and Reexports of Crude and Manufactured Rubber

Imports for Consumption of Crude and Manufactured Rubber

	April, 1948		May, 1948	
UNMANUFACTURED, Lbs.	Quantity	Value	Quantity	Value
Crude rubber	86,091,492	$15,136,536	86,280,100	$14,399,505
Rubber latex	5,114,720	1,260,932	7,711,008	1,915,744
Guayule	67,200	7,076	89,600	9,435
Balata	184,638	36,570	101,014	36,109
Jelutong or Pontianak	1,457,750	393,280	1,146,325	314,432
Gutta percha	115,644	68,366	54,285	54,191
Chicle	422,746	314,574	1,364,022	1,140,584
Synthetic rubber	549,760	104,539	198,579	37,725
Reclaimed rubber	2,250	543	.....	.....
Scrap rubber	1,505,584	20,676	1,738,278	36,520
TOTALS	95,511,784	$17,343,092	95,683,211	$17,944,245
MANUFACTURED				
Tires: auto, bus, and truck *no.*	162	$1,556	132	$11,833
Bicycle *no.*	2,466	2,917	1,952	1,634
Other *no.*	756	674	1,506	1,265
Inner tubes *no.*	2	5	13	75
Rubber footwear: boots *prs.*	31	69	1	4
Shoes and overshoes *prs.*	1,033	2,390	7,200	4,364
Rubber soled canvas shoes *prs.*	14,132	5,639	14,306	6,166
Rubber balls: golf *no.*	14,832	6,081	21,672	9,168
Tennis *no.*	.....	.....	2,306	1,139
Other *no.*	864	325	13,488	1,194
Rubber toys, except balloons	.....	695	.....	339
Hard rubber products	.....	3,398	.....	3,757
Rubber and cotton packing *lbs.*	.....	.....	1,148	1,514
Gaskets and valve packing	.....	62	.....	.....
Belting *lbs.*	145	198	1,028	2,225
Hose and tubing	.....	27	.....	36
Golf ball centers or cores *doz.*	.....	.....	85	242
Bands *lbs.*	.....	.....	400	320
Heels and soles	.....	.....	7	5
Instruments *doz.*	90	187	.....	.....
Soft rubber products, except drug sundries	.....	9,201	.....	11,538
Other rubber products	.....	.....	.....	371
Synthetic rubber products	.....	425	.....	4,478
TOTALS	.....	$33,849	.....	$60,667
GRAND TOTALS, ALL RUBBER IMPORTS	.....	$17,376,941	.....	$18,004,912

Exports of Domestic Merchandise

UNMANUFACTURED, Lbs.				
Crude rubber	1,754	$594	.....	.....
Chicle	135,454	68,708	78,534	$31,504
Balata	6,500	25,350	800	2,875
Jelutong and gutta percha	500	575	.....	.....
Synthetic rubber: GR-S	108,257	26,525	250,404	51,428
Butyl	22,400	4,144	.....	.....
Neoprene	1,062,726	355,976	477,669	157,716
Nitrile	70,050	27,358	93,875	37,049
"Thiokol"	750	587	8,995	4,728
Polyisobutylene	2,534	821	13,200	4,180
Other	6,801	3,278	51,034	11,868
Reclaimed rubber	2,349,961	187,705	2,123,600	167,400
Scrap rubber	5,562,795	161,706	8,641,685	262,161
TOTALS	9,330,482	$863,327	11,739,796	$730,905
MANUFACTURED				
Rubber cement *gals.*	45,260	$69,452	42,589	$55,584
Rubberized fabric: auto cloth *sq. yds.*	70,715	66,162	36,014	60,319
Piece goods and hospital sheeting *sq. yds.*	143,965	105,966	110,078	70,792
Rubber footwear: boots *prs.*	41,684	131,024	15,710	56,034
Shoes *prs.*	32,261	34,577	22,344	21,097
Rubber-soled canvas shoes *prs.*	80,547	138,073	113,544	191,624
Soles *doz. prs.*	31,681	90,924	31,180	79,044
Heels *doz. prs.*	81,003	64,181	61,649	54,971
Rubber soling and top-lift sheets *lbs.*	166,805	38,546	120,138	33,746
gloves and mittens *doz. prs.*	10,363	36,986	25,267	70,490
Drug sundries: water bottles and syringes *no.*	49,816	26,065	34,006	18,983
Other	.....	284,981	.....	270,226
Rubber and rubberized clothing	.....	123,500	.....	95,228
Balloons	.....	102,046	.....	74,963
Toys and balls	.....	75,785	.....	64,865
Bathing caps *doz.*	3,283	12,993	3,120	12,897
Rubber bands *lbs.*	5,680	4,546	5,426	4,193
Erasers *lbs.*	27,863	24,784	16,549	11,918
Hard rubber goods: battery boxes *no.*	55,121	72,596	39,313	43,716
Other electrical goods *lbs.*	153,662	84,180	112,300	37,555
Combs, finished *doz.*	9,672	8,015	25,014	13,589
Other products	.....	16,739	.....	26,011
Tire casings: truck and bus *no.*	110,844	4,577,929	97,494	4,308,128
Auto *no.*	55,636	787,449	45,113	682,231
Inner tubes: auto, bus, and truck *no.*	116,561	455,740	94,677	328,129
Other casings and tubes, except auto *no.*	53,746	892,777	46,260	764,827
Solid tires: auto and truck *no.*	3,680	118,351	5,609	199,152
Other *lbs.*	32,854	18,118	14,048	8,195
Tire repair materials: camelback *lbs.*	202,793	$58,103	171,250	$47,561
Other *lbs.*	186,879	108,010	122,021	59,564
Rubber and friction tape, except medical *lbs.*	92,075	57,790	58,566	33,677
Belting: auto fan belts *lbs.*	103,823	127,269	69,553	81,494
Other *lbs.*	1,816,470	1,449,343	1,517,077	1,218,900
Hose and tubing: garden hose *lbs.*	150,663	50,926	126,600	36,993
Other *lbs.*	657,478	491,621	585,752	425,238
Rubber packing *lbs.*	143,062	149,779	157,168	128,104
Mats, flooring, tiling *lbs.*	390,701	107,228	703,468	197,752
Thread: bare *lbs.*	37,238	62,844	49,132	79,961
Textile covered *lbs.*	15,484	40,212	13,723	34,343
Gutta percha manufactures *lbs.*	25,581	20,998	3,947	4,191
Latex and other compounded rubber for further manufacture *lbs.*	484,690	135,148	288,344	125,913
Other rubber products	.....	347,772	.....	295,881
TOTALS	.....	$11,670,471	.....	$10,414,079
GRAND TOTALS, ALL RUBBER EXPORTS	.....	$12,533,798	.....	$11,144,984

Reexports of Foreign Merchandise

UNMANUFACTURED, Lbs.				
Crude rubber	767,498	$190,815	2,308,758	$458,941
Balata	.....	.....	22,820	25,102
Jelutong and gutta percha	2,000	300	.....	.....
TOTALS	769,498	$191,115	2,331,578	$511,043
MANUFACTURED				
Tire casings and tubes *no.*	.....	.....	10	$231
Solid tires *no.*	6	$90	.....	.....
Hose and tubing *lbs.*	91	127	.....	.....
Rubber packing *lbs.*	.....	.....	195	115
Drug sundries, other than water bottles	.....	.....	8,133	1,301
TOTALS	.....	$8,350	.....	$1,647
GRAND TOTALS, ALL RUBBER REEXPORTS	.....	$199,465	.....	$512,690

SOURCE: United States Department of Commerce, Washington, D. C.

Gas Heating Package

(*Continued from page* 845)

is suitable for temperatures up to 350° F. The bricklined combustion chamber affords complete combustion of gas, and the burner has good turn-down range permitting proper temperature control. The fan capacity is 1,000 cubic feet of air a minute, and the hot air can be recirculated for greater fuel economy. Both the burner output and the air volume can be regulated for progressive temperature control and air circulation.

The midget heater is easy to install and simple to operate; it can be furnished with either indicating or non-indicating type of temperature controls. The safety devices are designed to shut off the gas supply in case of flame, power, or fan failure.

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(*Continued from page* 853)

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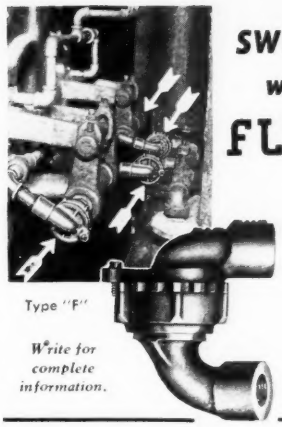

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Malayan Rubber Statistics

The following statistics for May, 1948, have been received from Singapore by way of Malaya House, 57 Trafalgar Square, London, W. C. 2, England.

Ocean Shipments from Singapore and Malayan Union—In Tons

To	Sheet and Crepe			Latex, Concentrated Latex, and Revertex (Dry Rubber Content)		
	Singapore Export Proper	Malayan Union Trans-shipped	Malayan Union Direct Shipments	Singapore Export Proper	Malayan Union Trans-shipped	Malayan Union Direct Shipments
Argentine Republic	....	....	75	6	....	....
Belgium	490	226	230	21	....	....
Canada	1,013	217	1,191	128	....	....
Chile	16	....	8	....	....	....
China	909	....	45	....	....	....
Cyprus	4	....	....	....	....	....
Czechoslovakia	887	....	95	....	....	....
Denmark	128	50	229	6	....	....
Egypt	12	....	....	1	....	....
Finland	224	25	....	10	....	....
France	2,369	175	1,386	76	4	4
Germany	4,019	326	1,536	....	....	....
Hong Kong	891	36	362	....	....	....
Iraq	6	....	....	....	....	....
Italy	1,018	234	850	40	59	30
Japan	375	35	1,305	....	....	....
Mexico	365	....	75	....	....	....
Netherlands	1,453	....	155	9	32	....
Norway	395	100	10	....	....	....
Other countries in South America	71	6	27	2	....	....
British countries in Africa	2	....	....	....	....	....
Portugal	10	....	409	....	....	....
Portuguese East Africa	9	....	....	....	....	....
Rumania	60	....	....	....	....	....
Russia	5,675	....	....	86	....	....
Siam	1	....	75	....	....	....
Spain	739	....	290	57	....	....
Sweden	703	147	814	18	....	....
Switzerland	77	....	....	3	....	....
Syria	3	....	....	....	....	....
Turkey	29	25	....	....	....	....
Union of South Africa	954	245	280	....	21	....
Union of India	274	....	....	....	....	....
United Kingdom	4,996	1,705	4,344	859	60	88
U. S. A.	16,922	2,150	19,747	1,044	5	1,666
TOTAL	45,092	5,702	33,738	2,360	181	1,788

Foreign Imports of Rubber in Long Tons

Singapore Imports from	Dry Rubber	Wet Rubber (Dry Weight)
Banka and Billiton	289	3
Brunei	39	1
Dutch Borneo	961	7
French Indo-China	....	5
Java	541*	21
North Borneo	536	23
Other Dutch Islands	73	3
Rhio Residency	766	84
Sarawak	3,024	30
Sumatra	7,098	6,151
Total	13,327	6,328

*Includes 24 tons sole crepe.

Federation of Malaya Imports from		
Burma	360	55
Siam	525	34
Sumatra	972	1,119
TOTAL	1,857	1,208

Dealers' Stocks	Tons
Singapore	51,894
Penang & Province Wellesley	12,509
TOTAL	64,403

Port Stocks in Private Lighters and Railway Godowns	
Penang & Province Wellesley	5,241
Port Dickson	200
Port Swettenham	4,503
Singapore	7,344
Teluk Anson	240
TOTAL	17,528

Production	
Estates	33,294
Small holdings (est.)	16,313
TOTAL	49,607

Survey of Resilience

(Continued from page 801)

Factors Affecting Resilience

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Carbon Black Statistics, Second Quarter, 1948

Following are statistics for the production, shipments, producers' stocks, and exports of carbon black for the second quarter of 1948. Production, shipments, and inventory figures are compiled from reports made available to the United States Bureau of Mines by the National Gas Products Association and by direct reports from producing companies whose operations are not covered by the Association. Export figures are reported by the U. S. Department of Commerce, but are not fully comparable in a given month because of the lapse of time between loading at producing plants and clearance for export.

(Thousands of Pounds)

	April	May	June	First Six Months, Total
Production:				
Contact types	54,556	57,653	54,681	335,863
Furnace types	53,613	55,569	51,915	321,773
TOTALS	108,169	113,222	106,596	657,636
Shipments:				
Contact types	50,730	57,566	53,148	331,451
Furnace types	47,102	49,998	48,966	296,421
TOTALS	97,832	107,564	102,114	627,872
Producers' Stocks, End of Month:				
Contact types	9,748	9,835	11,368	11,368
Furnace types	82,280	87,851	90,800	90,800
TOTALS	92,028	97,686	102,168	102,168
Exports, total	21,668	32,354	28,288	162,673

SOURCE: Bureau of Mines, United States Department of the Interior, Washington, D. C.

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EBONITE CONTAINER CO., LTD.

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Dominion of Canada Statistics

Imports of Crude and Manufactured Rubber

		June, 1948		June, 1947	
		Quantity	Value	Quantity	Value
UNMANUFACTURED					
Balata	lbs.	2,521	$ 1,013	11,564	$ 12,290
Crude rubber	lbs.	10,496,838	1,831,378	6,839,689	1,339,687
Latex	lbs.	239,731	69,787	484,647	154,873
Rubber, powdered and waste	lbs.	367,600	13,125	1,681,300	36,256
Recovered	lbs.	1,560,000	131,211	1,889,600	145,126
Synthetic and substitute	lbs.	244,700	75,983	226,200	60,148
TOTALS		12,911,450	$2,122,497	11,133,000	$1,748,300
PARTLY MANUFACTURED					
Comb blanks of hard rubber			1,472		$ 6,363
Hard rubber in rods or tubes	lbs.	118	179	2,868	3,515
Rubber thread, not covered		6,046	6,923	7,078	9,556
TOTALS		6,164	$ 8,574	9,946	$ 19,434
MANUFACTURED					
Bathing shoes	prs.	1,406	$ 985	5,430	$ 2,512
Belting			75,284		54,979
Boots and shoes of rubber, n.o.p.	prs.	4,591	4,688	15,939	16,039
Canvas shoes with rubber soles	prs.	200	523	1,066	2,356
Cement			37,386		45,693
Clothing of waterproofed cotton or rubber			1,441		5,578
Druggists' sundries			41,857		53,619
Gaskets and washers			38,351		41,093
Gloves	doz. prs.	456	1,724	985	4,448
Golf balls	doz.	2,758	12,060	1,580	5,682
Heels	prs.	19,059	4,217	2,862	483
Hose			40,388		45,167
Hot water bottles			779		2,564
Inner tubes, n.o.p.	no.	1,916	4,068	7,512	15,917
Bicycle	no.	9,945	4,643	1,836	962
Liquid sealing compound			22,809		6,241
Mats and matting			45,478		22,664
Nursing nipples	gross	365	1,962	1,285	5,344
Packing			20,643		15,241
Raincoats	no.			879	1,812
Tires pneumatic, n.o.p.	no.	2,183	73,269	22,924	288,026
Bicycle	no.	11,777	9,912	3,392	4,058
Solid for automobile and motor trucks	no.	31	618	31	705
Other			11,041		10,467
Tire repair material			8,251		13,710
Other rubber manufactures			390,867		363,667
TOTALS			$ 853,244		$1,029,027
TOTAL RUBBER IMPORTS			$2,984,315		$2,796,761

Exports of Crude and Manufactured Rubber

UNMANUFACTURED					
Crude rubber	lbs.	1,229,546	$ 234,466	2,410,196	$ 461,430
Waste rubber	lbs.	1,519,800	21,615	1,573,500	19,607
TOTALS		2,749,346	$ 256,081	3,983,696	$ 481,037
PARTLY MANUFACTURED					
Soling slabs of rubber	lbs.	3,305	$ 762		$
MANUFACTURED					
Bathing caps					$ 744
Belting, n.o.p.	lbs.	242,793	168,291	385,395	233,041
Belts, fan			6,719		4,436
Boots and shoes of rubber, n.o.p.	prs.	132,302	228,104	518,822	785,555
Canvas shoes with rubber soles	prs.	62,409	72,922	259,236	236,334
Clothing of rubber and waterproofed clothing			33,906		40,195
Heels		37,638	2,285	171,303	10,898
Hose			68,100		113,930
Inner tubes for motor vehicles	no.	42,582	118,399	67,712	189,730
Soles	prs.			800	164
Tires, pneumatic for motor vehicles	no.	71,179	1,796,977	65,561	1,271,148
Other	no.	162	844	1,169	1,277
Wire and cable, copper, insulated			141,104		239,869
Other rubber manufactures			16,447		74,490
TOTALS			$2,654,098		$3,231,814
TOTAL RUBBER EXPORTS			$2,910,941		$3,712,851

Controls on Tire Sales Relaxed in Peru

In Peru domestic tire manufacture has now progressed to the stage where it practically covers most tire needs in the popular sizes. Consequently the government is relaxing control over tire sales that has been in effect since 1942. By a ministerial resolution, effective June 10, 1948, sales of passenger-car tires became free; truck tires, however, are still subject to government control.

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FOR SALE—AT BARGAIN PRICES

1—#2 Banbury mixer, rebuilt complete throughout with 150 HP, 2300-volt synchronous motor and control—mixer complete with feed hopper and all accessories—jacketed sides.
1—#2 Banbury mixer chamber rebuilt complete with saddle—latest model spray-type sides.
1—#3A Banbury mixer chamber rebuilt complete with saddle, herringbone drive gear and pinion; late model spray-type sides.

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FOR SALE: 6 HEAVY-DUTY DOUBLE-ARM JACKETED MIXERS 50/150 gal; 2 Thropp 30" two-roll mixing mills. 7 Rotary 16-punch tablet presses. PERRY EQUIPMENT CORP., 1524 West Thompson Street, Philadelphia 21, Pa.

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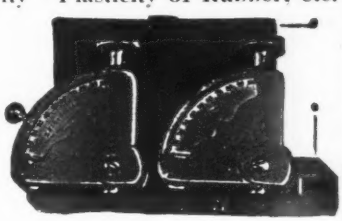

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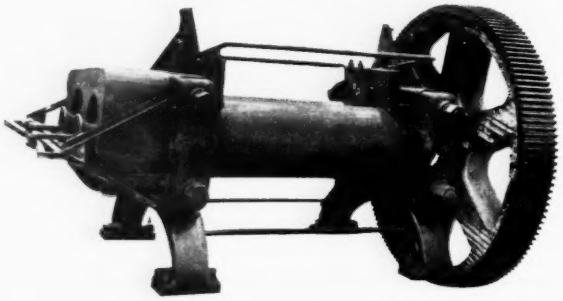

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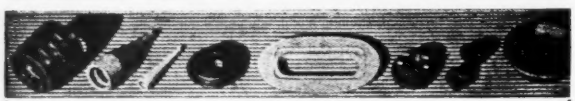

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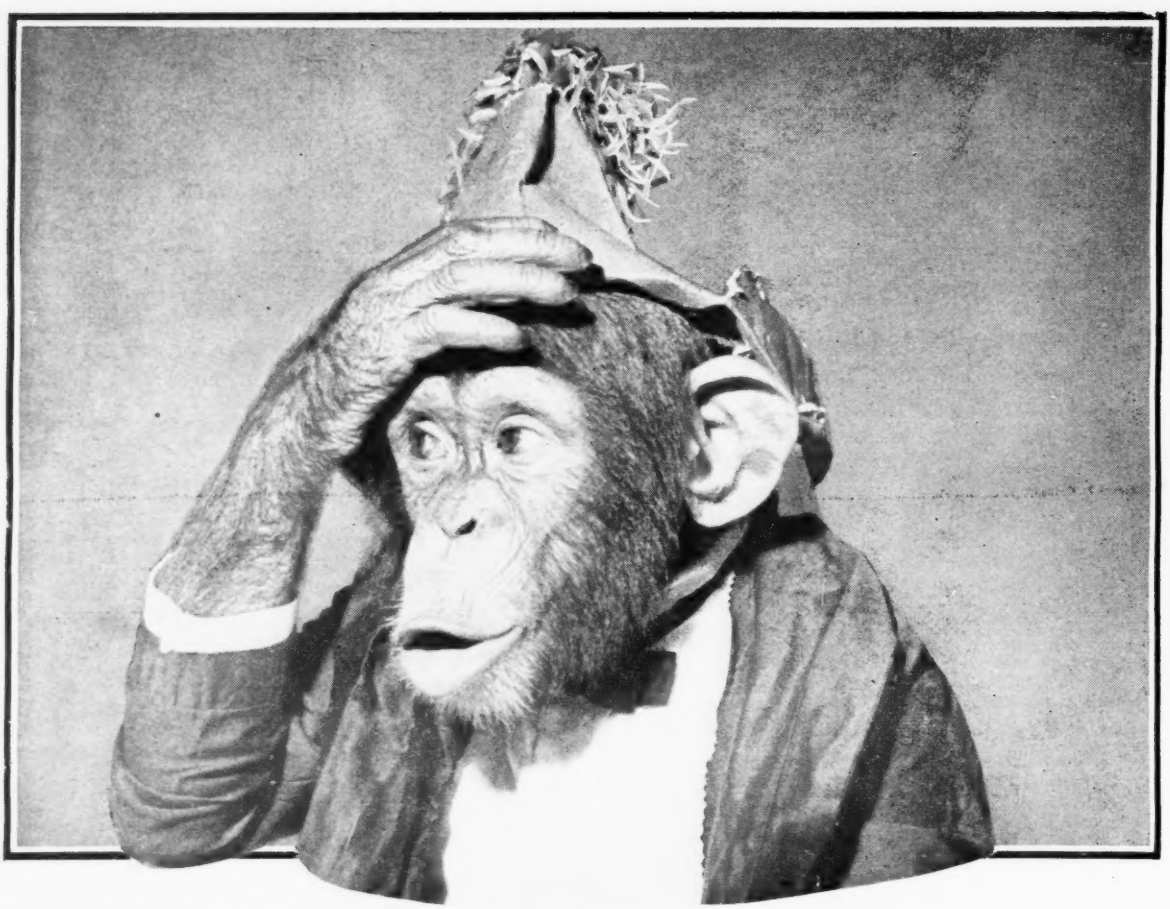

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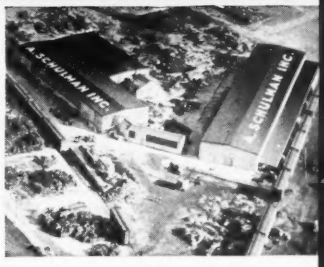

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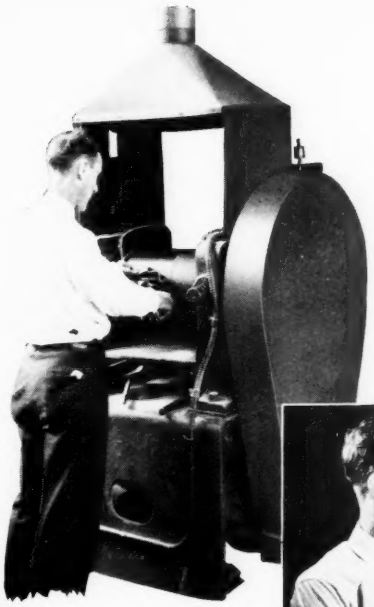
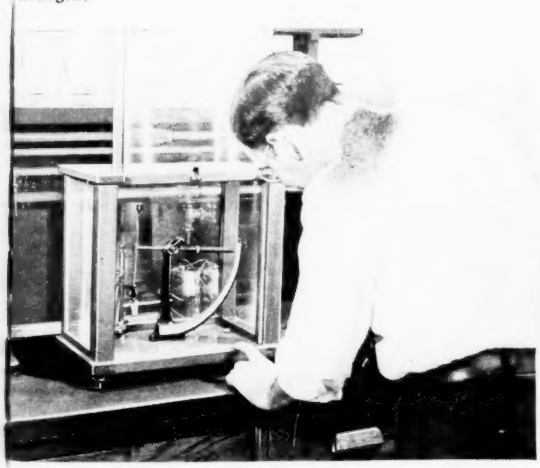


Experimental mill checks quality and workability of test materials.



Gravitometer determines the specific gravity of any material under analysis.

Laboratory Press makes tests of finished stock, ensuring uniform Schulman quality.

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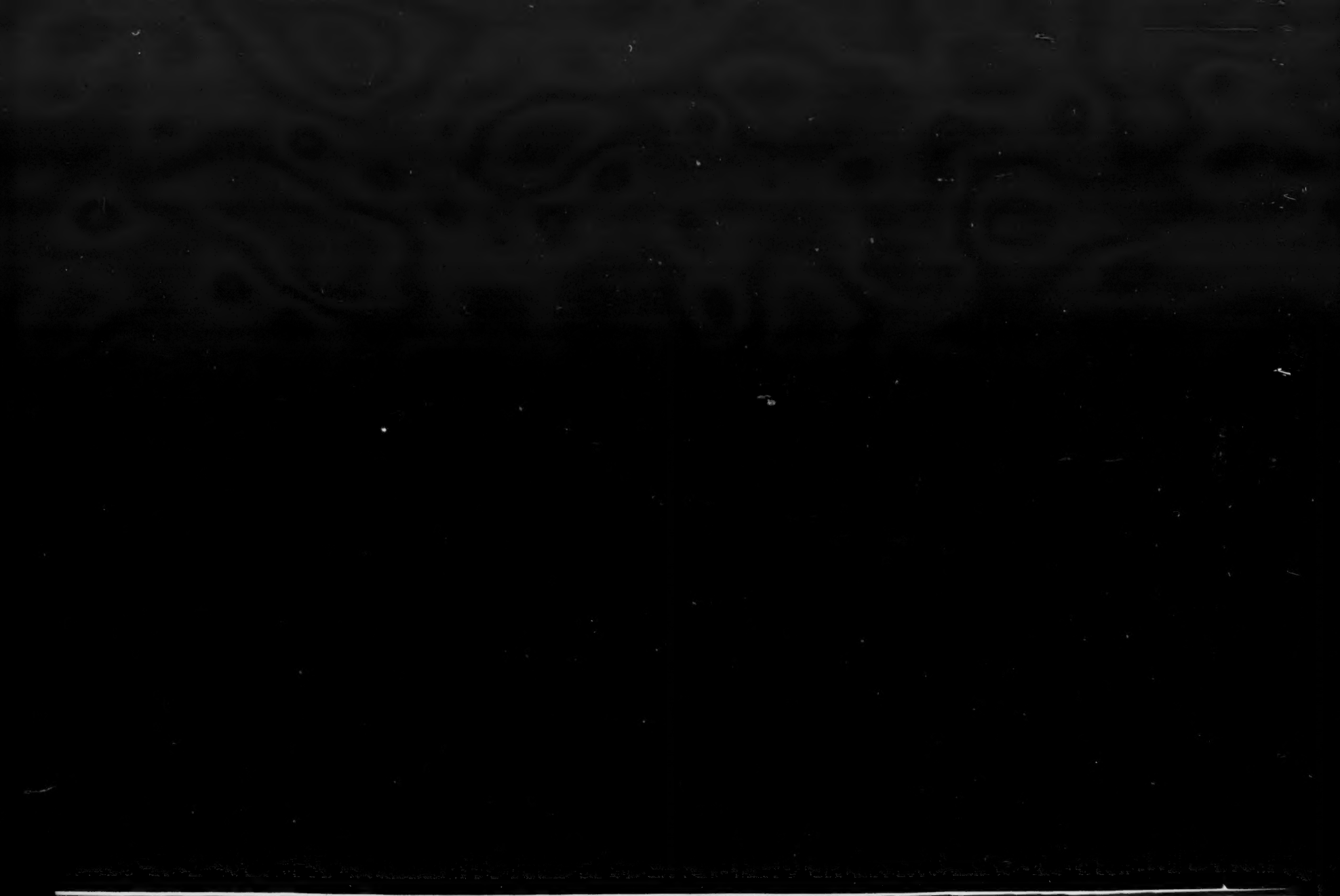
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